

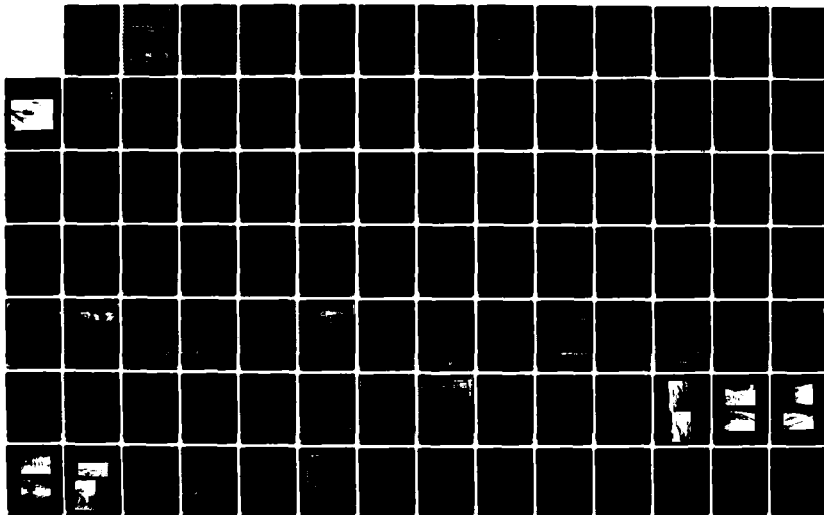
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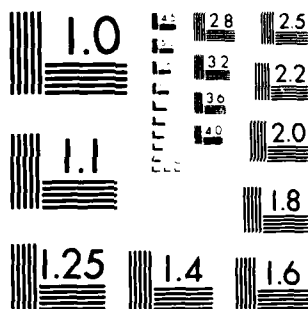
NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS  
BURNT HILL RESERVOIR..(U) CORPS OF ENGINEERS WALTHAM MA  
NEW ENGLAND DIV MAY 81

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**CONNECTICUT RIVER BASIN**  
**WEST HARTFORD, CONNECTICUT**  
**BURNT HILL RESERVOIR DAM**  
**CT 00488**

**PHASE 1 INSPECTION REPORT**  
**NATIONAL DAM INSPECTION PROGRAM**

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**DEPARTMENT OF THE ARMY**  
**NEW ENGLAND DIVISION, CORPS OF ENGINEERS**  
**WALTHAM, MASS**  
**MAY, 1981**

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The dam is an earth embankment with a good grass cover. It is approximately 1100 feet long and 38 feet high with a top width of 14 feet. Based on the visual inspection, review of design information, and past operational performance, the dam is judged to be in GOOD condition. This dam is classified as SMALL in size and a HIGH hazard potential structure. The test flood for this dam is the PMF.		



DEPARTMENT OF THE ARMY  
NEW ENGLAND DIVISION CORPS OF ENGINEERS  
424 TRAFALGAR ROAD  
WALTHAM, MASSACHUSETTS 02154

REPORT  
ATTACHED, 1

NEDED

JUL 09 1981

Honorable William A. O'Neill  
Governor of the State of Connecticut  
State Capitol  
Hartford, Connecticut 06115

Dear Governor O'Neill:

Inclosed is a copy of the Burnt Hill Reservoir Dam (CT-00488) Phase I Inspection Report, prepared under the National Program for Inspection of Non-Federal Dams. This report is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. I approve the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is vitally important.

Copies of this report have been forwarded to the Department of Environmental Protection. Copies will be available to the public in thirty days.

I wish to thank you and the Department of Environmental Protection for your cooperation in this program.

Sincerely,

C. E. EDGAR, III  
Colonel, Corps of Engineers  
Commander and Division Engineer

Incl  
As stated



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CONNECTICUT RIVER BASIN  
WEST HARTFORD, CONNECTICUT

BURNT HILL RESERVOIR DAM  
CT 00488

PHASE 1 INSPECTION REPORT  
NATIONAL DAM INSPECTION PROGRAM

## **NATIONAL DAM INSPECTION PROGRAM**

### **PHASE I - INSPECTION REPORT**

Identification No.: CT 00488  
Name of Dam: Burnt Hill Reservoir Dam  
Town: West Hartford  
County and State: Hartford County, Connecticut  
Stream: Trout Brook  
Date of Inspection: November 26, 1980

#### **BRIEF ASSESSMENT**

The dam is an earth embankment with a good grass cover. It is approximately 1100 feet long and 38 feet high with a top width of 14 feet. The principal spillway is a reinforced concrete riser with a 30 inch RCP. The emergency spillway is also a reinforced riser with a 60 inch RCP outlet. The 30 inch RCP extends from the principal spillway to the emergency spillway riser. The reservoir is used for flood control and is normally empty. The dam is owned by the State of Connecticut, Department of Environmental Protection.

Based on the visual inspection, review of design information, and past operational performance, the dam is judged to be in GOOD condition. There is some erosion due to vehicle trespass and animal burrows were noted in the embankment.

This dam is classified as SMALL in size and a HIGH hazard potential structure in accordance with the Recommended Guidelines for Safety Inspection of Dams, by the Corps of Engineers. The impoundment storage at the top of the dam is 280 ac.-ft. and the maximum height of the dam is 38 feet. Failure of the dam could result in the possible loss of more than a few lives and extensive economic damage to more than 15 homes and buildings along the downstream channel in West Hartford. The depth of inundation at these 15 homes and buildings would be 0 feet before and 3 to 10 feet after dam failure.

The test flood for this dam is the Probable Maximum Flood (PMF). The test flood has an inflow equal to 1080 cfs and an outflow discharge equal to 530 cfs at a stillwater elevation of 270.6 which will not overtop the dam (2.1 feet freeboard). The maximum outflow capacity of the spillways with the water level at the top of the dam is 560 cfs, which is 104 percent of the test flood outflow.

It is recommended that the following items be studied further by a qualified registered engineer: The need for augmenting the riprap stilling basin at the outlet and procedures for alleviating the wetness along the downstream toe of the southern embankment in the swale between the toe of the embankment and Middle Road. The reservoir should be visited when floodwaters are being impounded, to check for problem areas.

The following remedial measures should be taken by the owner: Recreational vehicle trespass should be eliminated, vehicle ruts should be repaired, animal burrows should be filled, the semi-annual inspections continued, and the existing flood emergency plan amended to provide downstream warning procedures.

Recommendations and remedial measures that should be implemented within two years of receipt of this Phase I Inspection Report are further described in Section 7.

JAMES P. PURCELL ASSOCIATES, INC.

*Sudhir A. Shah*

---

Sudhir A. Shah, P.E.  
Director of Engineering  
Connecticut P.E. No. 8012





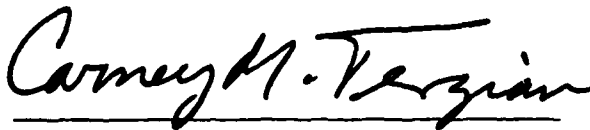
This Phase I Inspection Report on BURNT HILL RESERVOIR DAM (CT-00488) has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgement and practice, and is hereby submitted for approval.



JOSEPH W. FINEGAN, JR. MEMBER  
Water Control Branch  
Engineering Division

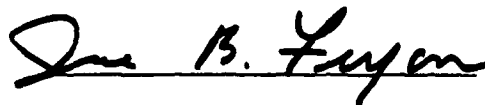


ARAMAST MAHTESIAN, MEMBER  
Geotechnical Engineering Branch  
Engineering Division



CARNEY M. TERZIAN, CHAIRMAN  
Design Branch  
Engineering Division

APPROVAL RECOMMENDED:



JOE B. FRYAR  
Chief, Engineering Division

## PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation. However, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and downstream damage potential.

The Phase I Investigation does not include an assessment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railings and other items which may be needed to minimize trespass and provide greater security for the facility and safety to the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.

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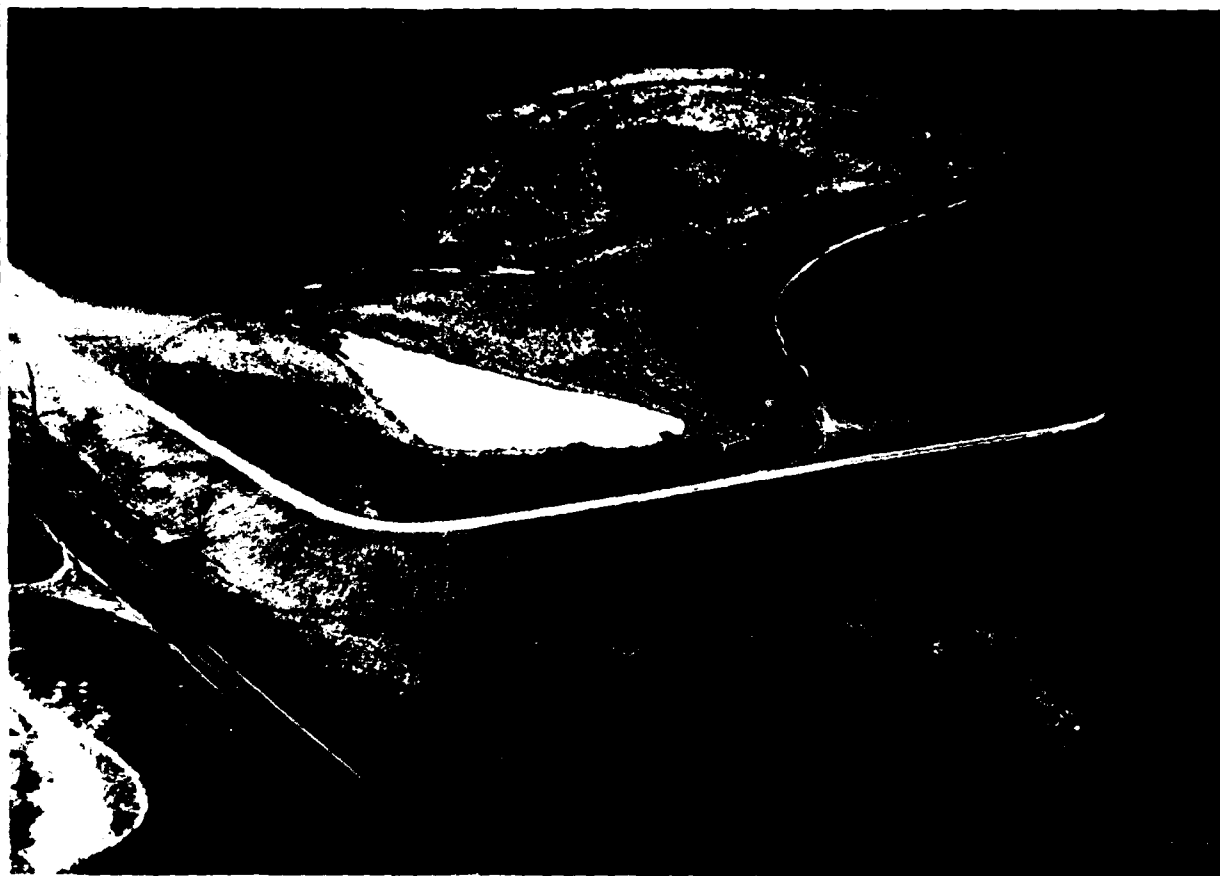
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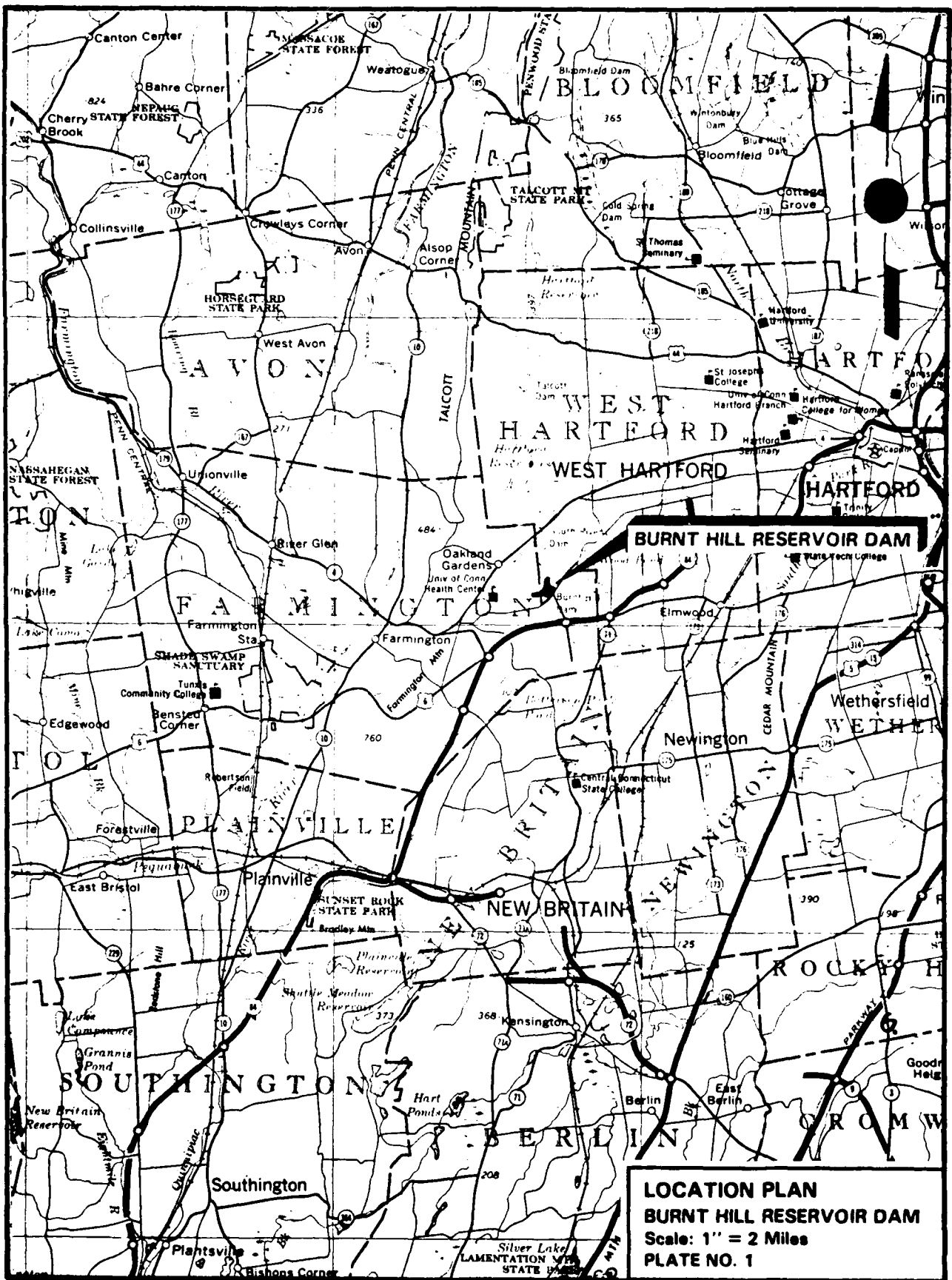
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OVERVIEW PHOTO - BURNT HILL RESERVOIR DAM

PHOTO TAKEN DECEMBER 15, 1980





# **NATIONAL DAM INSPECTION PROGRAM**

## **PHASE I - INSPECTION REPORT**

**NAME OF DAM: BURNT HILL RESERVOIR DAM**

### **SECTION 1**

#### **PROJECT INFORMATION**

##### **1.1 General:**

###### **a. Authority:**

Public Law 92-367, August 8, 1972, authorized the Secretary of the Army through the Corps of Engineers to initiate a national program of dam inspections throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. James P. Purcell Associates, Inc. has been retained by the New England Division to inspect and report on selected dams in the State of Connecticut. Authorization and notice to proceed was issued to James P. Purcell Associates, Inc., under a letter from William E. Hodgson, Jr., Colonel, Corps of Engineers. Contract No. DACW33-81-C-0009 has been assigned by the Corps of Engineers for this work.

###### **b. Purpose:**

1. Perform technical inspection and evaluation of non-federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-federal interests.
2. Encourage and prepare the States to initiate quickly, effective dam safety programs for non-federal dams.
3. To update, verify and complete the National Inventory of Dams.

##### **1.2 Description of Project**

###### **a. Location:**

The Burnt Hill Reservoir Dam is located in the Town of West Hartford, in Hartford County, Connecticut. It is on the north side of Middle Road, 0.5 miles north of

the interchange of I-84 and the proposed I-291 (See Plate No. 1). The dam is built across Trout Brook and is located 4200 feet upstream of Woodbridge Lake. The dam is at latitude 41°-44'-00.0" and longitude 72°-46'-37.0".

Trout Brook is a tributary to the South Branch of the Park River which flows through Hartford, Connecticut, to the Connecticut River.

All elevations used in this report are based on the Metropolitan District Commission (MDC) Datum except as noted. The MDC Datum minus 2.08 feet equals the National Geodetic Vertical Datum (NGVD).

**b. Description of Dam and Appurtenances:**

The Burnt Hill Reservoir Dam is an 1100 foot long earth embankment with a top elevation of 272.7. The dam is 38.2 feet high at the outlet, has a top width of 14 feet and side slopes of 3H:1V (upstream) and 2.5H:1V (downstream). The grass covered embankment consists of two zones of compacted earth, a 14 foot wide cutoff trench and a filter blanket seepage drain along the downstream toe. (See as-built plans in Appendix B).

The outlet works consist of a principal spillway and an emergency spillway. The principal spillway is a reinforced concrete riser and a 30 inch reinforced concrete pipe extending from the riser to the emergency spillway. Flow into the 30 inch pipe is restricted by a steel flow constriction plate attached to the upstream end of the pipe. This was done in order to achieve the design outflow rates with use of the 30 inch pipe required for internal inspection. The crest of the principal spillway riser is at elevation 240.0 and is protected by an angle iron trash rack. The small sediment pool formed by the riser can be drained by a 20 inch slide gate on the upstream end of the riser.

The emergency spillway is a 6 foot by 8 foot reinforced concrete riser and a 60 inch reinforced concrete pipe extending from the riser to a free outlet and riprap stilling basin at the downstream face of the dam. The crest of the emergency spillway is 266.5 and is protected by an angle iron trash rack.

**c. Size Classification:**

The size classification of this dam is SMALL as per the criteria set forth in the Recommended Guidelines for Safety Inspection of Dams, by the Corps of Engineers.

The impoundment storage at the top of the dam is 280 acre-feet (within the range of 50 to 1000 ac.-ft.) and the maximum height of the dam is 38.2 feet (within the range of 25 to 40 feet). The size classification of the dam is based on both the impoundment storage and height criteria.

**d. Hazard Classification:**

The hazard classification of this dam is HIGH as per the criteria set forth in the Recommended Guidelines for Safety Inspection of Dams, by the Corps of Engineers. More than 15 homes and buildings and 4 roads and bridges could suffer excessive damage. The potential exists for the loss of more than a few lives at downstream homes, in West Hartford, which may be inundated by 3 to 10 feet above ground level. Pre-failure flow would correspond to a depth of flow of approximately 2 feet throughout the impact area which would not inundate any structures. The homes and buildings range from approximately 4 to 10 feet above the normal brook level.

**e. Ownership:**

The Burnt Hill Reservoir Dam is presently owned and maintained by the State of Connecticut, Department of Environmental Protection.

**f. Operation:**

The person in charge of maintenance of the dam is:

Mr. Anthony Cantele  
Regional Director, Region I  
Conservation and Preservation Division  
Department of Environmental Protection  
P.O. Box 161  
Pleasant Valley, Connecticut 06063  
Telephone: (203) 379-0771

**g. Purpose:**

The dam is a floodwater retarding structure and provides flood protection to the flood plain of the South Branch of the Park River.

**h. Design and Construction History:**

The design of the dam was completed by the Soil Conservation Service in 1964 and construction was completed in 1966.

**i. Normal Operating Procedure:**

There are no day-to-day operational procedures for the dam. The reservoir is normally empty except for a small sediment pool and all flow is discharged through the principal spillway.

**1.3 Pertinent Data**

**a. Drainage Area:**

The Burnt Hill Reservoir Dam's drainage basin is roughly rectangular in shape with a length of 0.75 miles and an average width of 0.50 miles, resulting in a total drainage area of 0.38 square miles. (See drainage basin map in Appendix D.) The topography is generally steep terrain, with elevations ranging from a high of 449 feet to a low of 240 feet at the principal spillway crest. Stream and basin slopes are moderate to steep, 1.7 percent to 15 percent, respectively. The sediment pool has a surface area of 0.5 acres which is approximately 0.2 percent of the watershed.

**b. Discharge at Dam Site:**

There are no specific discharge records available for this dam. Listed below are calculated discharge values for the emergency spillway and outlet works (30 inch principal spillway).

1. Outlet Works: A 30 inch pipe with an invert at elevation 237.0 and a discharge capacity of 53 cfs at elevation 266.5.
2. Maximum known discharge at dam site: Unknown
3. Ungated Spillway capacity at top of dam: 560 cfs at elevation 272.7.
4. Ungated spillway capacity at test flood elevation: 530 cfs at elevation 270.6.
5. Gated spillway capacity at normal pool elevation: N/A
6. Gated spillway capacity at test flood elevation: N/A
7. Total spillway capacity at test flood elevation: 530 cfs at elevation 270.6.
8. Total project discharge at top of dam: 560 at elevation 272.7.
9. Total project discharge at test flood elevation: 530 cfs at elevation 270.6.

**c. Elevation (Feet above MDC Datum):**

1. Stream bed at toe of dam	234.5
2. Bottom of cutoff	229.5
3. Maximum tailwater	Unknown
4. Normal Pool	240.0
5. Full flood control pool	266.5
6. Spillway crest	266.5 (Emergency Spillway)
7. Design surcharge (Original Design)	269.7
8. Top of dam	272.7
9. Test flood level	270.6

**d. Reservoir (Length in feet):**

1. Normal pool	300
2. Flood control pool	1400
3. Spillway crest pool	1400 (Emergency Spillway)
4. Top of dam	3260
5. Test flood pool	2000

**e. Storage (acre-feet):**

1. Normal pool	0.6
2. Flood control pool	154
3. Spillway crest pool	154 (Emergency Spillway)
4. Top of Dam	280
5. Test flood pool	219

**f. Reservoir Surface (acres):**

1. Normal pool	.5
2. Flood control pool	14.6

3. Spillway crest	14.6 (Emergency Spillway)
4. Test Flood pool	20.0
5. Top of dam	23.0
<b>g. Dam:</b>	
1. Type	Earth embankment
2. Length	1100 feet
3. Height	38.2 feet
4. Top width	14 feet
5. Side slopes	Upstream 3H:1V Downstream 2.5H:1V
6. Zoning	Two zone compacted earth fill
7. Impervious core	None
8. Cutoff	14 foot wide cutoff trench
9. Grout curtain	None
10. Other	- -
<b>h. Diversion and Regulating Tunnel:</b>	<b>N/A</b>
<b>i. Spillway:</b>	<b>(Emergency Spillway)</b>
1. Type	Reinforced concrete riser with uncontrolled weir
2. Length of weir	25.33 feet
3. Crest elevation	266.5
4. Gates	None
5. U/S Channel	N/A
6. D/S Channel	60 inch RCP, earth channel
7. General	Good condition

j. Regulating Outlets:

(Principal spillway)

Refer to Paragraph 1.2b - "Description of Dam and Appurtenances" for description of Outlet Works.

- |                      |                              |
|----------------------|------------------------------|
| 1. Invert            | 237.0                        |
| 2. Size              | 30 inch                      |
| 3. Description       | Reinforced concrete pipe     |
| 4. Control mechanism | None                         |
| 5. Other             | Steel flow constrictor plate |

Riser Crest Elevation:  
240.0

20 inch slide gate on  
upstream end of  
principal spillway riser  
to drain sediment pool.

## SECTION 2

### ENGINEERING DATA

#### 2.1 Design

The available design data consists of the following documents and plans prepared by the Soil Conservation Service.

- a. "As-built" drawings of construction plans, Burnt Hill Reservoir Dam, 1964. Copies of these plans are included in Appendix B-3.
- b. Original design calculations and report.
- c. Stage-storage, stage-reservoir area, and stage-discharge curves.
- d. Information storage and retrieval form.

Refer to Appendix B-1 for the location of this material.

#### 2.2 Construction

The SCS provided inspection during the construction of the dam, which was completed in 1966. The SCS has construction inspection reports in storage. These reports were not reviewed in the preparation of this Phase I Inspection Report.

#### 2.3 Operation

There are no day-to-day operational procedures. The site is visually inspected semi-annually by the State of Connecticut. Inspection records are available from the owner.

#### 2.4 Evaluation

##### a. Availability:

All information concerning this dam was gathered by field investigation and meetings with the Soil Conservation Service and from the files of the Department of Environmental Protection, Water Resources Unit, Dam Safety Engineers, State Office Building, Hartford, Connecticut.

##### b. Adequacy:

The information that was available complimented a complete visual inspection of this facility and is adequate at this time.



**c. Validity:**

The engineering design data provided by the SCS has been deemed adequate for the purposes of this Phase I Inspection Report. The as-built plans appear to adequately represent the present configuration of the structures based upon the visual inspection. This investigation did not include a detailed engineering check of the SCS design file.

## SECTION 3

### VISUAL INSPECTION

#### 3.1 Findings

##### a. General:

The visual inspection of the Burnt Hill Reservoir Dam was conducted on November 26, 1980 and a copy of the visual inspection check list is contained in Appendix A of this report.

The following procedure was used:

1. Inspection of the upstream reservoir area which would be impounded by the dam.
2. Visual inspection of the face and top of the dam and spillway for cracks, settlement, seepage, etc.
3. Inspection of the outlet works and other appurtenances as to their existence, location, and operability.
4. Review of procedures that could be utilized in the event of an emergency situation.
5. A check of the downstream area for seepage, piping, boils or other indications of abnormal conditions. The downstream hazard potential in the event of dam failure was investigated.
6. Photographs of the general area of the dam and of specific items of note were taken and are included in Appendix C of this report.

Before the inspection, the available existing data was studied and reviewed.

##### b. Dam:

1. Crest: The dam consists of an earth embankment with no evidence of misalignment or settlement. The top of the dam is 14 feet wide and contains a grassed service road. There are wheel ruts along the top of the dam with bare earth exposed in places (Photos C-1, C-2).
2. Upstream Face: The upstream face consists of a grassed earth slope at 3H:1V. There are two areas of low brush (Photos C-2, C-6) which are reportedly test

patches of crownvetch and/or birds foot trefoil. There are vehicle ruts near the emergency spillway riser (Photo C-5) and several small animal burrows were noted at various locations. There appears to be erosion rills forming in the bend in the embankment. Small hummocks were also noted in this area.

3. Downstream face: The downstream face consists of an earth slope at 2.5H:1V with good grass cover (Photos C-1, C-3). The ground is wet along the toe at the south end of the dam (Photo C-4) which appears to be surface water trapped in the swale between the road and the embankment (Photo C-3). There is also a wet area at the toe north of the outlet which is probably due to groundwater from the hill at the north abutment. The as-built plans show the water table near the surface in this area. There are also minor hummocks and vehicle ruts (Photos C-4, C-9) in the embankment.

An area of filled animal burrows, located at the bend in the embankment, 1/3 of the way up from the toe was noted. A system of holes was noted, apparently due to animal burrows, at mid-height in the embankment approximately 100 feet south of the outlet. The largest of these holes was approximately 2 feet in diameter by 18 inches deep. Six feet down the embankment, another system of holes was noted, the largest being approximately 18 inches in diameter by 1 foot deep.

#### c. Appurtenant Structures:

1. Principal spillway: The principal spillway consists of a reinforced concrete riser and an uncontrolled 30 inch RCP extending from the riser to the emergency spillway. These concrete structures are in good condition. The riser is protected by an angle iron trash rack (Photo C-7) which is in good condition. A small operable sluice gate on the riser allows draining of the small sediment pool.
2. Emergency spillway: The emergency spillway consists of a reinforced concrete riser (Photo C-8) and an uncontrolled 60 inch RCP extending from the riser, through the dam to a free outlet at the downstream face (Photo C-9). These concrete structures are in good condition. An angle iron trash rack protects the inlet and the riser is surrounded by a locked chain link fence. There is a small riprap stilling basin at the outlet which appears adequate for normal flows, but may be inadequate for high discharge.

**d. Reservoir Area:**

There is no permanent reservoir except for a small sediment pool (Photo C-6). The immediate reservoir area is grassed with woodland beyond (Overview Photo). No unusual geologic features were noted that could be expected to adversely affect the dam or its appurtenant structures.

**e. Downstream Channel:**

The downstream channel consists of an excavated earth channel which extends approximately 240 feet to an existing stream (Photos C-9, C-10). The channel contains some sediment and grass, but is still adequate.

**3.2 Evaluation**

Based on the visual inspection, the Burnt Hill Reservoir Dam appears to be in good condition overall and there were no major areas of distress noted. Specific areas of concern that were noted are:

- a. The erosion due to vehicle trespass.
- b. The animal burrows in the embankment.
- c. The hummocky areas on the slopes.
- d. The adequacy of the riprap stilling basin for high discharges.
- e. The wet area between the road and the embankment at the south end of the dam.

It should be noted that this floodwater retarding reservoir was not filled at the time of inspection and thus the adequacy of the structure with regard to the functioning of the filter blanket toe drain and also with regard to the potential seepage problems could not be fully assessed. The reservoir should be visited by a qualified registered engineer when floodwaters are being impounded to check for problem areas. A record of maximum water levels should be kept for reference purposes.

## **SECTION 4**

### **OPERATIONAL AND MAINTENANCE PROCEDURES**

#### **4.1 Operational Procedures**

##### **a. General:**

There are presently no formal operational procedures for this facility.

##### **b. Description of Any Warning System in Effect:**

There is a formal written "Flood Emergency Plan" in effect for this facility. During a flood "watch", the structures are inspected to insure that the outlets are clear and free of debris. During a flood "warning", State personnel visit the site periodically (2-3 hours) and report on unusual situations. In the event of an emergency situation, the field inspector would call the State Dam Safety Engineer and a decision would be made as to further action to be taken. A copy of the applicable portions of this flood emergency plan is included in Appendix B.

#### **4.2 Maintenance Procedures**

##### **a. General:**

The grass cover is mowed on an annual basis. Other maintenance such as painting the trash racks and repairing erosion areas is performed on an "as needed" basis based on the findings of the semi-annual inspections.

##### **b. Operating Facilities:**

Maintenance of the principal and emergency spillways is as described above in Paragraph 4.2a.

#### **4.3 Evaluation**

The operational and maintenance procedures are generally satisfactory, but there are areas requiring improvements.

The formal written flood emergency plan should be amended to include downstream warning procedures.

## SECTION 5

### EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

#### 5.1 General

The Burnt Hill Reservoir Dam will create an impoundment with a total storage capacity of 154 ac.-ft. at elevation 266.5, the emergency spillway crest elevation. Each foot of depth in the reservoir above the emergency spillway crest can accommodate approximately 14 ac.-ft. The emergency spillway is a reinforced concrete riser with a crest 6.2 feet below the top of the dam. The drainage area is .38 square miles and stream and basin slopes are moderate to steep, 1.7 percent to 15 percent, respectively.

This project is unique in that both the principal and emergency spillway discharge into the same conduit (60 inch RCP). This situation was due to the planned use of the dam as a portion of the fill for a proposed highway, which precluded the use of a separate grassed channel emergency spillway.

#### 5.2 Design Data

- a. Original design data (standard SCS design methods) is available for this watershed and the structures of the Burnt Hill Reservoir. To verify existing design information, USGS topographic maps (scale 1"=2000') were utilized to develop hydrologic parameters such as drainage area, basin length, time of concentration, and other runoff characteristics. Surface area and storage values were verified and taken from the original design data. Some of the pertinent hydraulic design data was confirmed by actual field measurements at the time of the visual inspection.
- b. The original design discharge for the facility is 510 cfs with a corresponding freeboard of 3.0 feet.
- c. Outflow values (routing procedures) and dam overtopping analyses were computed in accordance with the guidelines developed by the Corps of Engineers. Judgment was used in calculating final values outlined in this report, which are quite approximate and should not be considered a substitute for actual detailed analysis.

#### 5.3 Experience Data

Historical data for recorded reservoir levels is not available for this dam.

#### **5.4 Test Flood Analysis**

Recommended Guidelines for the Safety Inspection of Dams by the Corps of Engineers were used for the selection of the "Test Flood". This dam is classified as a HIGH hazard and SMALL size structure. Guidelines indicate that 1/2 the Probable Maximum Flood (PMF) to the PMF be used as the "Test Flood" for these classifications. A "Test Flood" equal to the PMF was chosen to yield conservative results in light of the approximate nature of the analysis. The watershed has a total area of .38 square miles. Snyder's lag was calculated to be 1.3 hours and a Snyder peaking coefficient of 0.625 was used. The 200 square mile - 24 hour Probable Maximum Precipitation (PMP) is 21.5 inches. The flood hydrograph package, HEC-1 computer program, developed by the Corps of Engineers was utilized to develop the inflow hydrograph, route the flood through the reservoir, and for the dam overtopping analysis. A "Test Flood" inflow equal to the PMF was calculated to be 1080 cfs (2860 CSM) and 1/2 the PMF has an inflow value of 540 cfs (1430 CSM).

The emergency spillway capacity is hydraulically adequate to pass the "Test Flood" (PMF) and overtopping of the dam will not occur. The maximum outflow capacity of the project without overtopping the dam is 560 cfs. This corresponds to 104 percent of the test flood outflow. The maximum outflow discharge value for the "Test Flood" is 530 cfs corresponding to a depth of flow over the emergency spillway level of 4.1 feet. A spillway rating curve, outlet rating curve and stage-storage curve are included in Appendix D of this report.

At the emergency spillway crest elevation of 266.5, the capacity of the 30 inch outlet structure is 53 cfs. It will require approximately 2 days to empty the reservoir assuming a water surface initially at the emergency spillway crest. The reservoir was assumed to be initially empty for the test flood analysis. It was also assumed that no blockage of the spillways occurred. Due to the use of a riser structure for the emergency spillway, managing debris under flood conditions is essential to proper operation of the structure. The affect of tailwater was not considered.

#### **5.5 Dam Failure Analysis**

This dam is classified as a HIGH hazard structure. Failure discharge could cause damage and the possible loss of more than a few lives due to high velocities, impact from debris, and flooding to numerous residential homes and buildings along the downstream channel in West Hartford.

The calculated dam failure discharge is 63,300 cfs due to an assumed breach width of 235 feet and a pre-failure pool level equal to the emergency spillway crest.

The pre-failure flow downstream would be the principal spillway flow of 53 cfs, corresponding to a depth of flow of approximately 2 feet. No structures would be inundated by this pre-failure flow. The failure impact area has been extended downstream 4200 feet to Woodbridge Lake. Homes in this area may be inundated by from 3 to 10 feet above ground level. The homes and buildings range from approximately 4 to 10 feet above the normal brook level. The failure volume would be contained by Woodbridge Lake and Wood Pond with a corresponding rise in the water level of 1.8 feet. Water surface elevations due to dam failure are listed on page D-17.



## **SECTION 6**

### **EVALUATION OF STRUCTURAL STABILITY**

#### **6.1 Visual Observation**

The visual inspection revealed no signs of major physical distress. The earth embankment appears in generally good condition. Minor deficiencies were noted such as erosion gullies caused by vehicle tracks on the crest and slopes, wet areas along the downstream toe and several animal burrows.

It should be noted that this floodwater retarding reservoir was not filled at the time of inspection and thus the adequacy of the structure with regard to the functioning of the filter blanket toe drain and also with regard to potential seepage problems could not be fully assessed.

#### **6.2 Design and Construction**

The design information available consists of the design calculations and report, as-built construction plans, and construction inspection reports. The location of this information is given in Appendix B-1.

#### **6.3 Post-Construction Changes**

There have been no post-construction changes to the dam or appurtenant structures since completion in 1966.

#### **6.4 Seismic Stability**

The dam is in Seismic Zone 1 and hence does not require evaluation for seismic stability according to the Corps of Engineers Recommended Guidelines.

## **SECTION 7**

### **ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES**

#### **7.1 Dam Assessment**

##### **a. Condition:**

Based on the visual inspection, past performance and hydraulic/hydrologic evaluation, the Burnt Hill Reservoir Dam and appurtenances are judged to be generally in GOOD condition. Items of concern that should be addressed as a result of this inspection are listed in Sections 7.2 and 7.3.

##### **b. Adequacy:**

The information available is such that the assessment of the safety of the dam should be based on the visual inspection results, the past operational performance of this structure, and the design information that is available.

##### **c. Urgency:**

The recommendations and remedial measures described below should be implemented by the owner within two years after receipt of this Phase I Inspection Report.

#### **7.2 Recommendations**

It is recommended that the owner engage a qualified registered engineer to carry out the following actions and that his recommendations be implemented.

- a. Investigate the need for augmenting the riprap stilling basin at the outlet.
- b. Investigate procedures for alleviating the wetness along the downstream toe of the southern embankment in the swale between the toe of the embankment and Middle Road.
- c. The reservoir should be visited when floodwaters are being impounded to check for problem areas. A record of maximum water levels should be kept for reference purposes.

### **7.3 Remedial Measures**

#### **a. Operation and Maintenance Procedures:**

1. During the semi-annual inspections, identify all animal burrows and repair as necessary.
2. Repair all erosion gullies, hummocks, and vehicle tracks on the upstream and downstream faces of the embankment and along the top of the dam, and revegetate all disturbed areas.
3. Recreational vehicle access to the structures should be eliminated.
4. Continue the semi-annual technical inspection program.
5. The existing formal written flood emergency plan should be amended to include downstream warning procedures.

### **7.4 Alternatives**

There are no practical alternatives to the above stated recommendations.

# **APPENDIX A**

## **INSPECTION CHECK LIST**

# INSPECTION CHECK LIST

## PARTY ORGANIZATION

PROJECT Burnt Hill Reservior Dam DATE November 26, 1980

TIME 1:00 - 4:00 p.m.

WEATHER Clear

W.S. ELEV. \_\_\_\_\_ U.S. \_\_\_\_\_ DN.S. \_\_\_\_\_

### PARTY:

- |   |           |
|---|-----------|
| 1. <u>R. Johnston, JPPA</u>               | 6. _____  |
| 2. <u>J. Hewes, JPPA</u>                  | 7. _____  |
| 3. <u>J. Walsh, Baystate</u>              | 8. _____  |
| 4. <u>Environmental Consultants, Inc.</u> | 9. _____  |
| 5. _____                                  | 10. _____ |

PROJECT FEATURE	INSPECTED BY	REMARKS
1. <u>Hydraulics</u>	<u>R. Johnston</u>	
2. <u>Structural</u>	<u>J. Hewes</u>	
3. <u>Geotechnical</u>	<u>J. Walsh</u>	
4. _____		
5. _____		
6. _____		
7. _____		
8. _____		
9. _____		
10. _____		

# INSPECTION CHECK LIST

PROJECT Burnt Hill Reservoir Dam DATE November 26, 1980  
 PROJECT FEATURE \_\_\_\_\_ NAME \_\_\_\_\_  
 DISCIPLINE \_\_\_\_\_ NAME \_\_\_\_\_

AREA EVALUATED	CONDITION
<p><u>DAM EMBANKMENT</u></p> <p>Crest Elevation 272.7</p> <p>Current Pool Elevation 240.0</p> <p>Maximum Impoundment to Date</p> <p>Surface Cracks</p> <p>Pavement Condition</p> <p>Movement or Settlement of Crest</p> <p>Lateral Movement</p> <p>Vertical Alignment</p> <p>Horizontal Alignment</p> <p>Condition at Abutment and at Concrete Structures</p> <p>Indications of Movement of Structural Items on Slopes</p> <p>Trespassing on Slopes</p> <p>Vegetation on Slopes</p> <p>Sloughing or Erosion of Slopes or Abutments</p> <p>Rock Slope Protection - Riprap Failures</p> <p>Unusual Movement or Cracking at or near Toes</p> <p>Unusual Embankment or Downstream Seepage</p> <p>Piping or Boils</p> <p>Foundation Drainage Features )</p> <p>Toe Drains )</p> <p>Instrumentation System</p>	<p>Good grass cover. Wheel ruts.</p> <p>Principal Spillway Riser Crest</p> <p>Unknown</p> <p>None observed</p> <p>N/A</p> <p>None observed</p> <p>None observed</p> <p>Good</p> <p>Good</p> <p>Good</p> <p>None observed</p> <p>Yes. Numerous wheel ruts. Grass. Two low brush areas. Minor hummocks. Possibly related to animal burrows.</p> <p>None observed.</p> <p>Minor possible oversteepening of downstream toe due to vehicle trespass north of outlet.</p> <p>None observed.</p> <p>None observed</p> <p>None observed. Plans show granular filter drains.</p> <p>Concrete slab slope gage on upstream face just south of spillways.</p>

# INSPECTION CHECK LIST

PROJECT Burnt Hill Reservoir Dam DATE November 26, 1980  
 PROJECT FEATURE \_\_\_\_\_ NAME \_\_\_\_\_  
 DISCIPLINE \_\_\_\_\_ NAME \_\_\_\_\_

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE</u>	Principal Spillway
a. Approach Channel	Sediment pool
Slope Conditions	Good. Grassed.
Bottom Conditions	Good
Rock Slides or Falls	None observed
Log Boom	None observed
Debris	None observed
Condition of Concrete Lining	N/A
Drains or Weep Holes	N/A
b. Intake Structure	Concrete riser with angle iron trash rack.
Condition of Concrete	Under water. Appears good.
Stop Logs and Slots	None observed
Condition of Trash Rack	Good
	<u>NOTE:</u> Small slide gate allows drainage of sediment pool. Slide gate operable.

# INSPECTION CHECK LIST

PROJECT Burnt Hill Reservoir Dam

DATE November 26, 1980

PROJECT FEATURE \_\_\_\_\_

NAME \_\_\_\_\_

DISCIPLINE \_\_\_\_\_

NAME \_\_\_\_\_

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - TRANSITION AND CONDUIT</u>	30 inch RCP extends from intake to emergency spillway. 60 inch RCP extends to outlet.
General Condition of Concrete	Good
Rust or Staining on Concrete	None observed
Spalling	None observed
Erosion or Cavitation	None observed
Cracking	None observed
Alignment of Monoliths	Good
Alignment of Joints	Good
Numbering of Monoliths	14 pipe sections (from plans)
	<u>NOTE:</u> Water flowing through conduit during inspection. 60 inch RCP observed from outlet. 30 inch RCP not visible.



# INSPECTION CHECK LIST

PROJECT Burnt Hill Reservoir Dam DATE November 26, 1980  
 PROJECT FEATURE \_\_\_\_\_ NAME \_\_\_\_\_  
 DISCIPLINE \_\_\_\_\_ NAME \_\_\_\_\_

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL</u>	Free Outlet. 60 Inch RCP.
General Condition of Concrete	Good
Rust or Staining	None observed
Spalling	None observed
Erosion or Cavitation	None observed
Visible Reinforcing	None observed
Any Seepage or Efflorescence	None observed
Condition at Joints	Good
Drain holes	None observed
Channel	Excavated channel extends approx. 240 ft. to natural stream in woods. Trees in woods beyond excavated channel.
Loose Rock or Trees Over- hanging Channel	
Condition of Discharge Channel	Fair. Grass and sediment in channel. Would not hinder flood discharge.
A-5	

# INSPECTION CHECK LIST

PROJECT Burnt Hill Reservoir Dam

DATE November 26, 1980

PROJECT FEATURE \_\_\_\_\_

NAME \_\_\_\_\_

DISCIPLINE \_\_\_\_\_

NAME \_\_\_\_\_

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNFLS</u>	Concrete Emergency Spillway Riser and Angle Iron Trash Rack
a. Approach Channel	N/A. Entire reservoir.
General Condition	
Loose Rock Overhanging Channel	
Trees Overhanging Channel	
Floor of Approach Channel	
b. Weir and Intake Structure	
General Condition of Concrete	Good
Rust or Staining	Minor due to trash rack.
Spalling	None observed
Any Visible Reinforcing	None observed
Any Seepage or Efflorescence	None observed
Drain Holes	None observed
c. Discharge Channel	Same as principal spillway.
General Condition	Fair.
Loose Rock Overhanging Channel	None observed.
Trees Overhanging Channel	None observed.
Floor of Channel	Grass and sediment buildup.
Other Obstructions	Woods at end of channel.
	<u>NOTE:</u> Angle iron and a few rocks are in the invert of the riser. Riser surrounded by locked chain link fence.

# **APPENDIX B**

## **ENGINEERING DATA**

## APPENDIX B-1

### DESIGN, CONSTRUCTION AND MAINTENANCE RECORDS

#### Location

#### Items

Mr. Victor J. Galgowski  
Dam Safety Engineer  
Water Resources Unit  
Department of Environmental Protection  
State of Connecticut  
State Office Building  
Hartford, Connecticut 06115

- 1. As Built Plans
- 2. State Inspection Reports
- 3. Rating Curves
- 4. Flood Emergency Plan

Mr. Whitney T. Ferguson, Jr.  
State Conservation Engineer  
Soil Conservation Service  
U.S. Department of Agriculture  
Mansfield Professional Park  
Storrs, Connecticut 06268

- 1. As Built Plans
- 2. Design Report
- 3. Design Calculations
- 4. Construction Inspection Reports
- 5. Information Storage and Retrieval Form

• Indicates material contained in this Phase I Inspection Report.

## DESIGN REPORT

SOUTH BRANCH PARK RIVER  
BURNT HILL RESERVOIR  
SITE NO. 4  
HARTFORD COUNTY, CONNECTICUT

This floodwater retarding dam is located in West Hartford, Connecticut on Trout Brook. The transparent overlay on sheet 4 of this report, together with the Meridan, Connecticut quadrangle published by the U.S. Geological Survey, locates the structure more accurately.

The classification of this structure is class (c) (Engineering Memorandum SCS-27) and is designed in accordance with the applicable criteria established by the Soil Conservation Service. Consideration has been given also to the future plans of the Connecticut State Highway Department for the future incorporation of the dam embankment into a proposed highway fill.

This structure is one of the four which will provide flood protection for the flood plain of the South Branch of the Park River and for the future proposed highway. It is designed to handle the recorded rainfall runoff of the 1955 hurricanes "Carol" and "Diane." It is anticipated that the structure's emergency spillway will operate during storms of this magnitude, whose probable frequency of occurrence is rarer than once in a hundred years.

This structure is designed as a compacted earth dam on a pervious foundation. A foundation drainage system in the downstream portion of the embankment controls the effects of seepage that may develop.

This structure will provide only flood control features. There will not be any permanent sediment pool. A low stage, reinforced concrete riser will control low flows through a 30-inch inside diameter reinforced concrete pipe to the high stage riser set back in the embankment. In order to provide desirable flood prevention for high frequency storms the entrance to the conduit will be restricted by a steel plate to an orifice opening that will allow a discharge comparable to that of a 18-inch diameter pipe. Later this opening may be increased, if desirable, to the full release rate of the conduit. A 13-inch opening in the upstream face of this riser will permit complete drainage of the reservoir area.

It is planned to eventually incorporate this dam into the fill of a primary highway, where it will be impossible to provide an earth spillway. It is necessary, therefore, to completely flood route through an automatically operating principal spillway the maximum storm runoff from the most severe storms. To do this requires a large reinforced concrete riser discharging into a 60-inch diameter reinforced concrete water pipe conduit. High velocity discharge from this conduit will have its energy dissipated in a rock riprap protected stilling basin of approved design. This will control erosion in the outfall channel.

REFERENCE:	U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE ENGINEERING & WATERSHED PLANNING UNIT JOHN DARTY, PENNSYLVANIA	DRAWING NO. CN-421-R  SHEET 1 OF 5 DATE 11-29-63
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## DESIGN REPORT

With the eventual construction of the highway, the stilling basin will be moved downstream to the outlet of the extended conduit. All openings on the risers will be adequately protected from clogging by carefully designed trash racks.

The results of the hydrologic and hydraulic determinations are given in the following table:

Factor Which Determines Stage	Surface Area Acres	Runoff in Inches	Peak Inflow c.f.s.	Peak Outflow c.f.s.	Elev. of Maximum Stage	Storage in Ac.-Ft.	Element of Structure Determined by Maximum Stage
50-year sediment accumulation	0.52	-	-	-	240.0	0.62	Crest of low stage riser
Storm runoff August 1955 storm	14.6	9.95	526	107	266.5	154.0	Crest of high stage riser and emergency spillway
Routing 1.75 x 6 hr. pt. rainfall moisture condition III	18.7	16.42	2540	510	269.70	207.0	Design high water
Routing 2.5 x 6-hr. pt. rainfall moisture condition II	23.0	22.16	3525	557	272.7	280.0 <i>124</i> <i>154</i>	Top of dam

The duration of flow in the emergency spillway is 10.59 hours.

The time to empty the entire flood pool from the crest of the emergency spillway is 2 days.

The geology and the soil mechanics laboratory reports were used to determine the adequacy of the design.

The following publications were used in the design of this dam:

National Engineering Handbook No. 5, Hydraulics  
 National Engineering Handbook No. 4, Hydrology  
 National Engineering Handbook No. 6, Structural Design  
 National Engineering Memorandum No. 31  
 Engineering Division Technical Releases Nos. 2, 5 and 10

REFERENCE:

U.S. DEPARTMENT OF AGRICULTURE  
 SOIL CONSERVATION SERVICE  
 ENGINEERING & WATERSHED PLANNING UNIT  
 WPER DABBY, PENNSYLVANIA

DRAWING NO.  
 CN-421-R

SHEET 2 OF 3  
 DATE 11-29-63

## DESIGN REPORT

Copies of these publications may be obtained from Mr. N. Paul Tedrow,  
State Conservationist, USDA, Soil Conservation Service, Storrs, Connecticut.

Concurred:

Gerald E. Oman  
Design Engineer

T. R. Wire  
State Conservation Engineer

Vincent McKeever  
Hydrologist

Robert F. Fonner  
Geologist

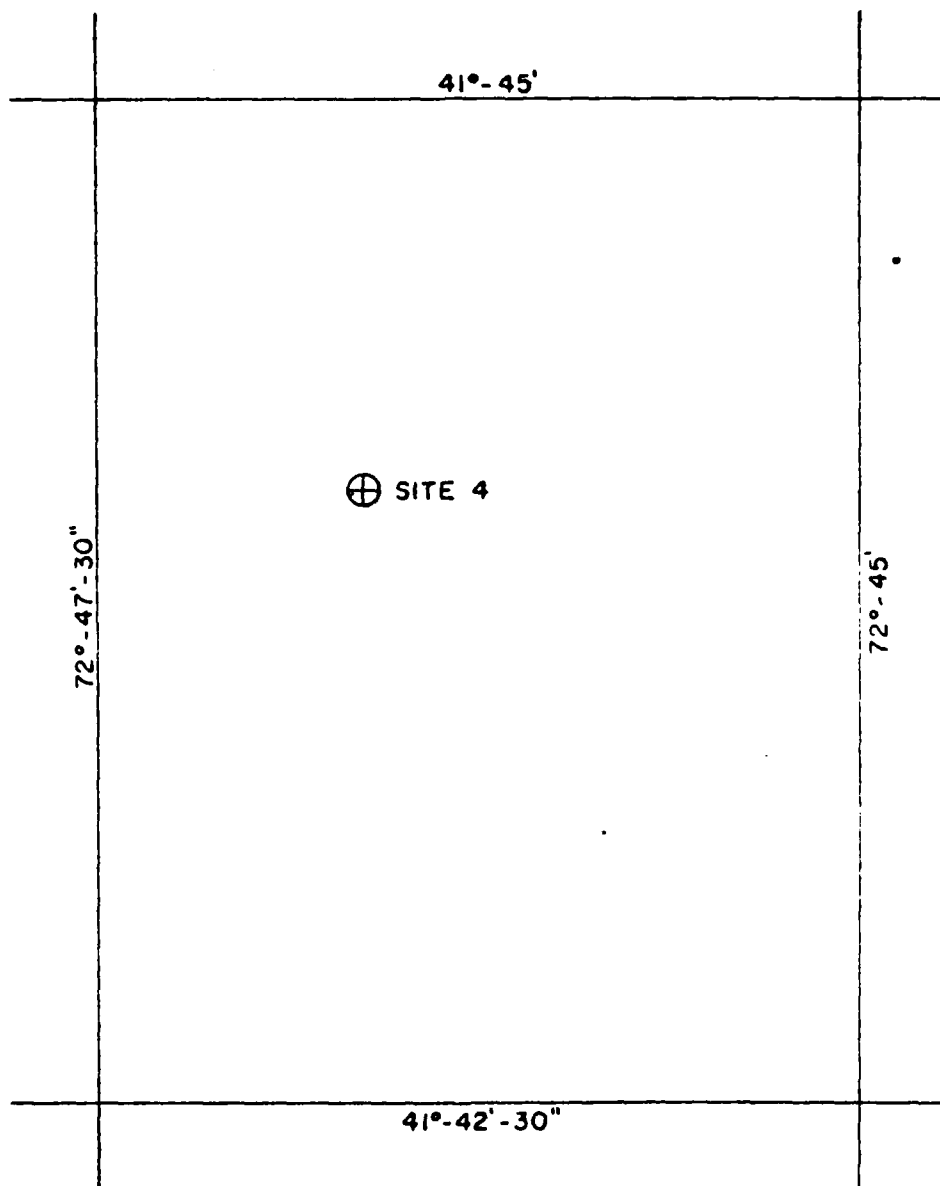
REFERENCE:

U.S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE  
ENGINEERING & WATERSHED PLANNING UNIT  
UPPER MERY, PENNSYLVANIA

DRAWING NO.  
CN-421-R

SHEET 3 OF 5  
DATE 11-29-63

# DESIGN REPORT



REFERENCE  
USGS 7 1/2' QUADRANGLE  
NEW BRITAIN, N.Y.

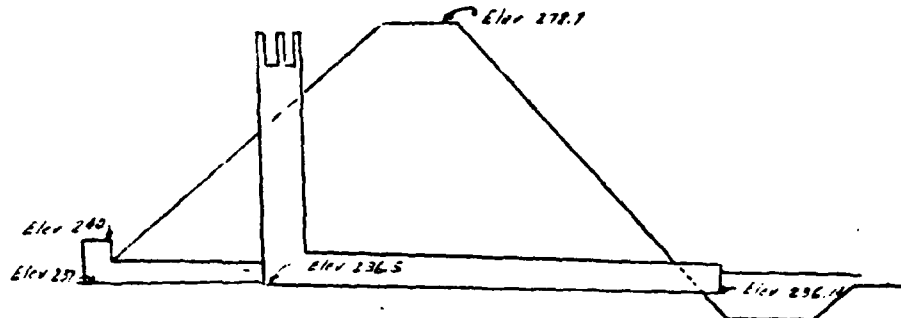
U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE  
ENGINEERING & WATERSHED PLANNING UNIT  
UPPER DARBY, PENNSYLVANIA

DRAWING NO.  
CN-421-R  
SHEET 4 OF 5  
DATE \_\_\_\_\_



# DESIGN REPORT

## Summary Sheet



## X-Section

### I. Watershed data

A. Structure class	(c)	
B. Drainage area	243	Ac.
C. Time of concentration - T	0.5	Hrs.
D. Hydrologic curve number - $C_n$		
1. Moisture condition II <sup>n</sup>	76	
2. Moisture condition III	89	

### II. Principal spillway

A. Conduit		
1. Size (I.D.)	60	In.
2. Length	150.33	Ft.
B. Riser		
1. Size	6x8	Ft.
2. Height	36.75	Ft.
C. Weir length	14	Ft.
D. Orifice size	None	in.
E. Pond drain size	18	in.

### III. Emergency spillway (see concrete riser above)

A. Width	no earth spillway)	Not applicable	Ft.
B. Side slopes			
C. Length of level section			Ft.
D. Exit slope			Ft/Ft.
E. Maximum velocity at control section (D.H.W.)	28.12	Ft/Sec.	
F. Duration of flow (D.H.W.) through emergency spillway	10.6	Hrs.	
G. Frequency of use	1%		

### REFERENCE:

U.S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE  
ENGINEERING & WATERSHED PLANNING UNIT  
UPPER DARBY, PENNSYLVANIA

DRAWING NO.  
CN-421-R

SHEET 3 OF 5

DATE 11-29-63

IDENTIFICATION AND LOCATION

1. Site 4, Burnt Hill  
STRUCTURE DESIGNATION (NAME OR NUMBER)  
Park River-Conn. River
2. RIVER BASIN (NAME)  
South Branch-Park River
3. WATERSHED (NAME OR UNNAMED)  
Connecticut
4. STATE (NAME)  
Hartford
5. COUNTY (NAME)  
West Hartford
6. TOWNSHIP (NAME)  
1
7. CONGRESSIONAL DISTRICT (NUMBER)  
Central Connecticut Lowlands
8. PHYSIOGRAPHIC AREA (NAME)  
WP
9. AUTHORIZATION (WP, FP, RCSD, CO-DT, PILOT)  
41 44 00
10. LATITUDE (DEGREES, MINUTES, SECONDS)  
72 46 37
11. LONGITUDE (DEGREES, MINUTES, SECONDS)  
272.7
12. ELEVATION OF TOP OF DAM (SETTLED FILL-FEET MSL)  
1962
13. DATE PLAN APPROVED  
1972
14. DATE OF MOST RECENT SUPPLEMENT (LEAVE BLANK IF NOT SUPPLEMENTED)  
1966
15. DATE CONSTRUCTION COMPLETED (LEAVE BLANK IF NOT COMPLETED)  
EARTH, ROCK, CONCRETE, OTHER
16. TYPE OF DAM (CIRCLE APPLICABLE) -  
EARTH, ROCK, CONCRETE, OTHER
17. PLANNED PURPOSES (CIRCLE ALL APPLICABLE) -  
FLOOD PREVENTION, RECREATION, FISH & WILDLIFE,  
MUNICIPAL AND INDUSTRIAL WATER SUPPLY, IRRIGATION,  
NAVIGATION, HYDRO-ELECTRIC, SEDIMENT CONTROL,  
LOW FLOW ALIMENTATION, OTHER
18. HAZARD CLASS (A, B, OR C) C
19. EARTHQUAKE ZONE 2/ (0, 1, 2, 3, or 4) 1

SIZE AND CAPACITY

20. DRAINAGE AREA UNCONTROLLED (UPSTREAM FROM STRUCTURE) 243 AC.
21. DRAINAGE AREA CONTROLLED (UPSTREAM FROM STRUCTURE) AC.
22. MAXIMUM FILL HEIGHT 36 FT.  
(FROM LOW POINT ON CENTERLINE, BEFORE EXCAVATING,  
TO TOP OF SETTLED FILL.)
23. CREST LENGTH OF DAM (ALONG CENTERLINE) 1100 FT.
24. VOLUME OF FILL 69,300 CU. YD.

25. SLURGED SEDIMENT STORAGE } 0.62 AC. FT.
26. AERATED SEDIMENT STORAGE } AC. FT.
27. MUNICIPAL AND INDUSTRIAL WATER STORAGE AC. FT.
28. RECREATION WATER STORAGE AC. FT.
29. FISH AND WILDLIFE STORAGE AC. FT.
30. IRRIGATION STORAGE AC. FT.
31. OTHER BENEFICIAL STORAGE AC. FT.
32. TOTAL FLOOD STORAGE 280 AC. FT.
33. TEMPORARY EMERGENCY SPILLWAY STORAGE (BETWEEN CREST  
OF LOWEST EMERGENCY SPILLWAY AND TOP OF SETTLED FILL)  
No F.M. SPILWY. 0 AC. FT.
34. SURFACE AREA OF NORMAL POOL AC.
35. LENGTH OF SHORE LINE OF NORMAL POOL MILES
36. MAXIMUM DEPTH OF NORMAL POOL FT.

PRINCIPAL SPILLWAY FEATURES

37. PRINCIPAL SPILLWAY TYPE (CIRCLE APPLICABLE) -  
PIPE MONOLITHIC, OPEN CONCRETE STRUCTURE, OTHER
38. IS THERE COLD WATER RELEASE FACILITY? No
39. NUMBER OF STAGES 2 (1 or 2)
40. LOW STAGE CAPACITY 107 CFS  
(AT HIGH STAGE PRINCIPAL SPILLWAY CREST)
41. PRINCIPAL SPILLWAY CAPACITY 557 CFS  
(AT LOWEST EMERGENCY SPILLWAY CREST)

PRINCIPAL SPILLWAY CONDUIT FEATURES

42. MAJOR PORTION OF CONDUIT IS ON (CIRCLE APPLICABLE) -  
ROCK OR EARTH
43. TYPE OF ENERGY DISSIPATOR (CIRCLE APPLICABLE) -  
IMPACT BASIN, SAF, PLUNGE POOL, NONE, OTHER
44. CONDUIT SIZE 5.0'  
(LARGEST CONDUIT THROUGH DAM) (DIAM. IN FT. IF ROUND)  
(HEIGHT AND WIDTH IN FT. IF MONOLITHIC) ALSO SHOW  
NUMBER OF BARRELS IF MULTI-BARREL
45. INLET TYPE (CIRCLE APPLICABLE) - CONCRETE-OPEN TOP  
COVERED TOP, WOOD INLET, METAL-OPEN TOP, OTHER
46. HEIGHT OF RISER 35' FT.  
(FROM TOP OF FLOOR TO TOP OF ANTI-VORTEX)

EMERGENCY SPILLWAY FEATURES

47. PRIMARY EMERGENCY SPILLWAY TYPE (CIRCLE APPLICABLE)  
CLOSED CONDUIT, OPEN CONCRETE STRUCTURE, EARTH,  
VEGETATED, SOFT ROCK, HARD ROCK 3/ None
48. PRIMARY EMERGENCY SPILLWAY WIDTH None FT.  
(CREST LENGTH FOR CONCRETE)
49. PERCENT CHANCE OF USE OF PRIMARY EMERGENCY SPILLWAY %

1/ N. M. Fenneman, 1938, Physiography of Eastern United States, McGraw Hill Book Co., New York, N. Y.

2/ See TSC Technical Note - Engineering UD-22.

3/ Soft Rock - Rock that will erode when subjected to flowing water.  
Hard Rock - Rock that is resistant to erosion due to flowing water.

EMERGENCY SPILLWAY FEATURES (CONT'D.)

50. \_\_\_\_\_ CFS  
CAPACITY OF PRIMARY EMERGENCY SPILLWAY  
(WHEN POOL IS AT TOP OF DAM)

51. \_\_\_\_\_ FT.  
DIFFERENCE IN ELEVATION BETWEEN CREST OF PRIMARY  
EMERGENCY SPILLWAY AND TOP OF DAM

52. SECONDARY EMERGENCY SPILLWAY IS (CIRCLE APPLICABLE)  
NONE EARTH, VEGETATED, SOFT ROCK, HARD ROCK 3/

53. WIDTH OF SECONDARY EMERGENCY SPILLWAY \_\_\_\_\_ FT.

54. CAPACITY OF SECONDARY EMERGENCY  
SPILLWAY (WHEN POOL IS AT TOP OF DAM) \_\_\_\_\_ CFS

55. \_\_\_\_\_ FT.  
DIFFERENCE IN ELEVATION BETWEEN CREST OF SECONDARY  
EMERGENCY SPILLWAY AND TOP OF DAM

OMIT ITEMS 56-59 IF DRAINAGE AREA IS  
LESS THAN 10 SQUARE MILES

56. BULK LENGTH OF SOFT ROCK 3/ EARTH \_\_\_\_\_ FT.  
OR VEGETATED SPILLWAY (SEE TR-52 FOR DEFINITION)

57. \_\_\_\_\_  
PT OF SURFACE MATERIAL IN EARTH OR VEGETATED  
SPILLWAY (PREDOMINANT MATERIAL AT OR NEAR SURFACE  
BEFORE TOP SOILING)

58. \_\_\_\_\_  
USCS CLASSIFICATION OF ABOVE MATERIAL

59. \_\_\_\_\_ AC. FT.  
VOLUME OF OUTFLOW THROUGH VEGETATED OR EARTH  
SPILLWAY (DURING PASSAGE OF FREEBOARD HYDROGRAPH)

COST DATA

WORK PLAN

60. LAND RIGHTS COST \$ 545,678

76. REMARKS \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

61. FEDERAL SHARE OF LAND RIGHTS COST \$ \_\_\_\_\_

62. CONSTRUCTION COST \$ 53,600  
(DOES NOT INCLUDE LAND RIGHTS, ENGINEERING AND  
PROJECT ADMINISTRATION)

63. FEDERAL SHARE OF CONSTRUCTION COST IN PERCENT 100 %

COMPLETED STRUCTURE

64. FINAL CONSTRUCTION COST \$ 92,900

ADDITIONAL DATA REQUIRED FOR U.S. REGISTER OF DAMS  
(LEAVE BLANK FOR DAMS LESS THAN 33 FT. IN HEIGHT)

65. Burnt Hill  
POPULAR NAME OF DAM

66. \_\_\_\_\_  
NAME OF RESERVOIR

67. NEAREST CITY OR TOWN West Hartford

68. TYPE OF DAM IF CONCRETE (CIRCLE APPLICABLE)  
BUTTRESS, ARCH, MULTI-ARCH

69. IS DISCHARGE THROUGH PRINCIPAL SPILLWAY CONTROLLED  
BY GATES? No

70. ESTIMATED COMPLETION DATE \_\_\_\_\_  
(IF UNDER CONSTRUCTION)

71. OWNER State of Connecticut ( )

72. ENGINEERING BY Soil Conservation Serv.

73. CONSTRUCTION BY Greenfield Construction  
(CONSTRUCTION CONTRACTOR)

74. ABOVE DATA FURNISHED BY Joseph Polulech  
(NAME)

75. DATE DATA FURNISHED 11/75

3/ Soft Rock - Rock that will erode when subjected to flowing water.  
Hard Rock - Rock that is resistant to erosion due to flowing water.

*FLOOD EMERGENCY PLAN PP 6*  
*CONN. DEPT. ENVIR. PROT*

will commence. The pump and hoses are stored in Building No. 17.

- d. All gates will be inspected to insure proper closing without clogging by debris.
- e. Screen well house openings will be closed. The closure will consist of
  - (i) stoplogging the one entrance door into the structure,
  - (ii) closing the maintenance trough opening with the steel plate mounted outside the building, and
  - (iii) the sluice gate on the opening under the well house floor will be secured.

The flood works are on the property of Chase Brass and Cooper Co., Inc., and AMTRAK. Chase Brass has agreed to assist in maintaining and operating these works. The individuals assigned to these responsibilities from Chase Brass are as follows:

L. Conard 756-9448

B. Kleinselbeck 754-8229

(A guard is on duty 24 hours at the plant.)

- ▷ 5. Soil Conservation Service Flood Control Structures: The dams listed below are dry flood control dams which are owned and operated by the State of Connecticut. Their sole purpose is to impound and slowly release flood water. In order to properly operate, it is imperative the culverts be clear and free of debris. For this reason, upon notification of a watch the structures should be inspected to insure clear outlets. During a warning the dams will be inspected at approximately 2 - 3 hour intervals. Inspections should consist of
- a. estimating the height of water,
  - b. looking for piping failures, sand boils, or other abnormal leakage, especially in the vicinity of the culvert outlets, and
  - c. looking for the development of slope sloughing or other structural problems.

Findings of each inspection should be reported immediately to the F.E.O.C.

*FLOOD EMERGENCY PLAN PP 7*  
*CONN. DEPT. ENVIR PROT.*

Crew Assignments:

Bloomfield Reservoir, Site 2, Tunxis Ave. Bloomfield

Bloomfield Reservoir, Site 3a, Tunxis Ave., Bloomfield

Blue Hills Reservoir, Filley Street, Bloomfield

Wintonbury Reservoir, Filley Street, Bloomfield

Coldspring Reservoir, Simsbury Road, Bloomfield

Crew:	Home	Office
Marilyn Aarrestad	658-5593	242-1158
Thomas Noonan	247-1847	242-1158
Calvin Innes	653-2996	242-1158

Thousand Acre Swamp, New Marlboro, Massachusetts

Westside Reservoir, Westside Road, Norfolk

Norfolk Reservoir, Route 44, Norfolk

Wood Creek Reservoir, Route 272, Norfolk

Whiting River Reservoir, Canaan Valley Road, North Canaan

Crew:

Stanley Civco	542-5423	SAME
---------------	----------	------

Roaring Brook, Unionville

South Reservoir, Farmington Avenue, West Hartford

▷ Burnt Hill Reservoir, Tunxis Road, West Hartford

Eugbee Reservoir, Hickory Lane, West Hartford

Talcott Reservoir, Route 44, West Hartford

Crew:

Robert Corbidge	673-3955	677-1819
Phillip Johnson	673-2943	677-1819
Ransom Watson	677-1819	677-1819

6. Highland Lake Flood Control Works: As part of the Flood works for Winsted, the dam at the north end of Highland Lake can be sandbagged prior to flooding to increase the storage capacity

*Whitney To  
Take Charge*

## **APPENDIX B-2**

### **COPIES OF PAST INSPECTION REPORTS**

CONTINUATION OF  
INVENTORY DATA

CT 488

Name of Dam or Pond Burnt Hill Reservoir Site # 4

Code No. WH 12

Nearest Street Location Seldon Hill Drive Tunxis Rd.

Town West Hartford

Zone 12°46.6'

U.S.G.S. Quad. New Britain

LAT 41°44.1'

Name of Stream Trout Brook

Owner State of Conn.

Address Dept. of Agriculture & Natural Resources  
State Office Bldg.  
Hartford, Conn.

Pond Used For Flood Control b4 0.3831

Dimensions of Pond: Width \_\_\_\_\_ Length \_\_\_\_\_ Area 23

Total Length of Dam 910' 1085' Length of Spillway \_\_\_\_\_

Location of Spillway NORTH END

Height of Pond Above Stream Bed 30.3'

Height of Embankment Above Spillway 6.2'

Type of Spillway Construction Riser + RCP

Type of Dike Construction Earth

Downstream Conditions \_\_\_\_\_

Summary of File Data \_\_\_\_\_

Remarks P A 22 A 243.2 A

Should include Survey Number B-12 Class B

1958

## **APPENDIX B-3**

### **RECORD DRAWINGS AND SKETCHES**



# SOUTH BRANCH PARK RIVER WATERSHED PROJECT

## FLOODWATER RETARDING DAM NO. 4 BURNT HILL RESERVOIR

DRAINAGE AREA	243.2	ACRES
FLOOD STORAGE TO EMERGENCY SPILLWAY CREST	280	ACRE FT.
WATER SURFACE AREA AT EMERGENCY SPILLWAY CREST	23	ACRES
HEIGHT OF DAM	36	FEET
VOLUME OF FILL	69,300	CUBIC YARDS

BUILT UNDER THE WATERSHED PROTECTION AND  
FLOOD PREVENTION ACT

BY

COMMISSIONER OF AGRICULTURE AND NATURAL RESOURCES  
STATE OF CONNECTICUT

WITH THE ASSISTANCE OF THE  
SOIL CONSERVATION SERVICE

OF THE

UNITED STATES DEPARTMENT OF AGRICULTURE

1964

SHEET 1 - COVER SHEET  
SHEET 2 - PLAN OF STORAGE AND BORROW AREAS  
SHEET 3 - PLAN OF DAMSITE  
SHEET 4 - PROFILES  
SHEET 5 - SEEPAGE DRAIN DETAILS  
SHEET 6 - WATERWAY DETAILS  
SHEET 7 - PLAN - PROFILE OF PRINCIPAL SPILLWAY  
SHEET 8 - LOG OF TEST HOLES  
SHEET 9 - LOG OF TEST HOLES  
SHEET 10 - EMERGENCY SPILLWAY DETAILS  
SHEET 11 - CRADLE, COLLAR, BENT & RISER DETAILS  
SHEET 12 - TRASH RACK & MISC DETAILS

WATERSHED PROJECT

DAM NO 4

RESERVOIR

243.2 ACRES

80 ACRE FT.

23 ACRES

36 FEET

100 CUBIC YARDS

PROTECTION AND  
ACT

NATURAL RESOURCES  
CUT  
OF THE  
SERVICE

AGRICULTURE

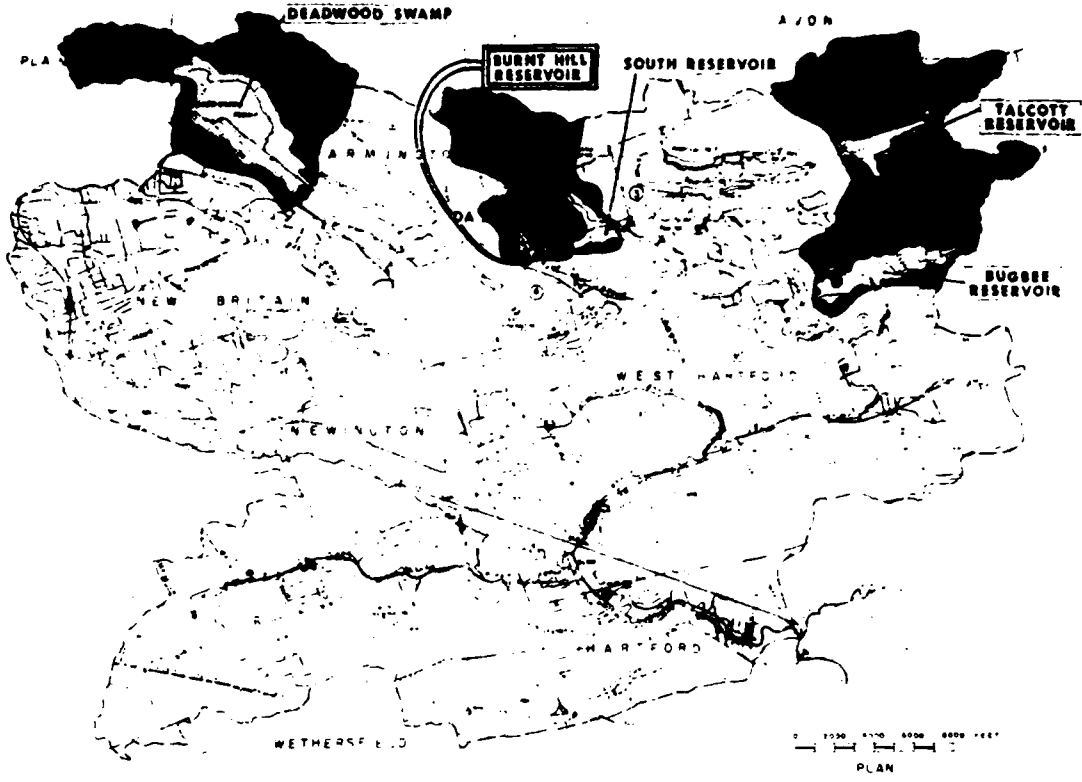
ROW AREAS

AL SPILLWAY

DETAILS

RISER DETAILS

TAILS



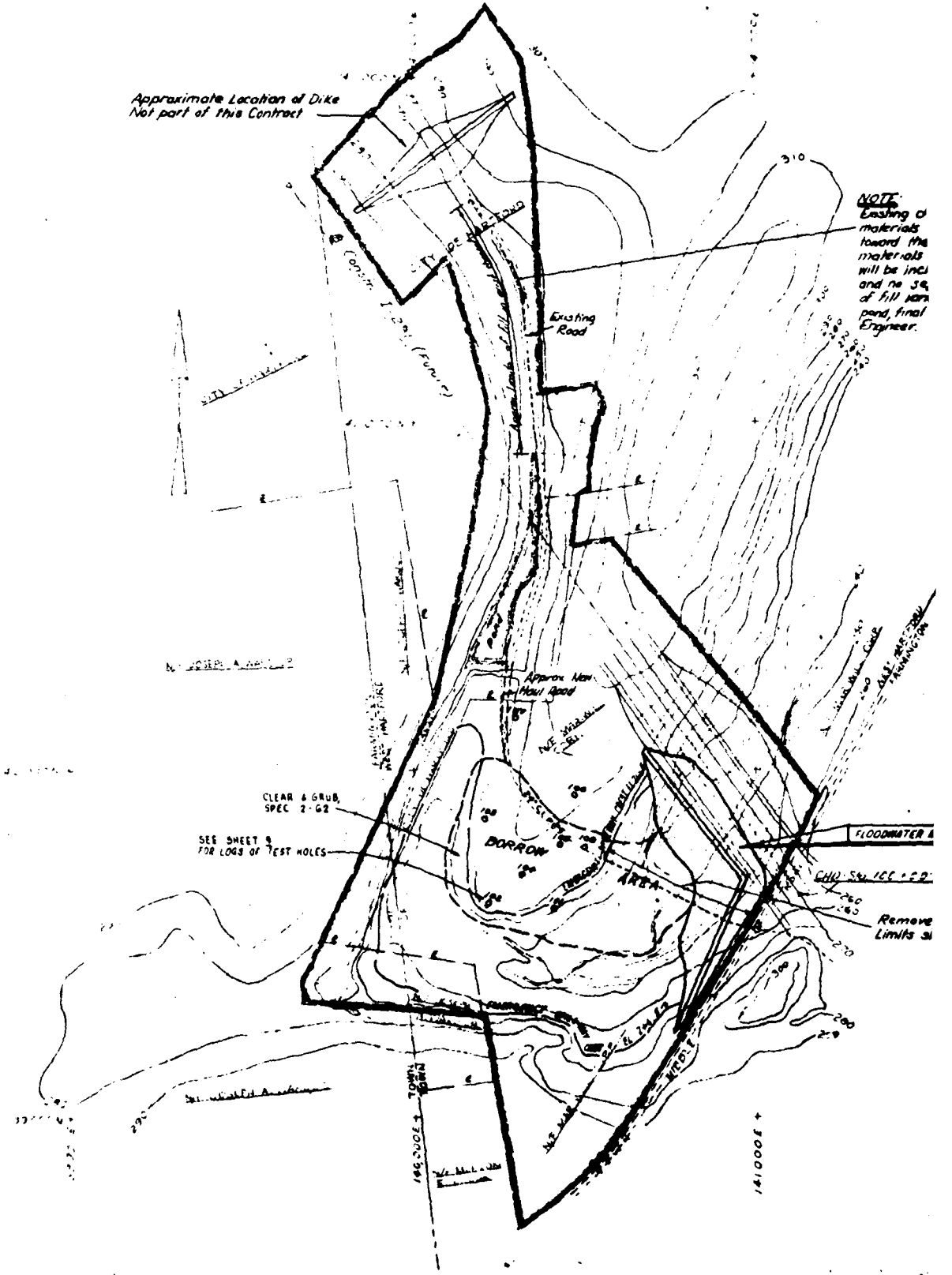
AS-BUILT

SOUTH BRANCH PARK RIVER WATERSHED PROJECT FLOODWATER RETARDING DAM NO. 4 BURNT HILL RESERVOIR WEST HARTFORD, CONN. <b>COVER SHEET</b>			
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE			
WT. FERGUSON G. J. MERCER		Nov 63 HEAD, E. & S. WP. UNIT	
M. MIKOLICH		Nov 63 State Conservation Engineer	
WMA ALLABAND		Dec 63	
CN-421-P			

No	By	Description	Date
1	WTF	Adj. for I-291 Highway etc.	11/63
Revisions			

Approximate Location of Dike  
Not part of this Contract

NOTE:  
Easting of materials  
toward the  
materials  
will be incl  
and no se  
of fill here  
pond, final  
Engineer.



CLEAR & GRUB,  
SPEC 2-G2

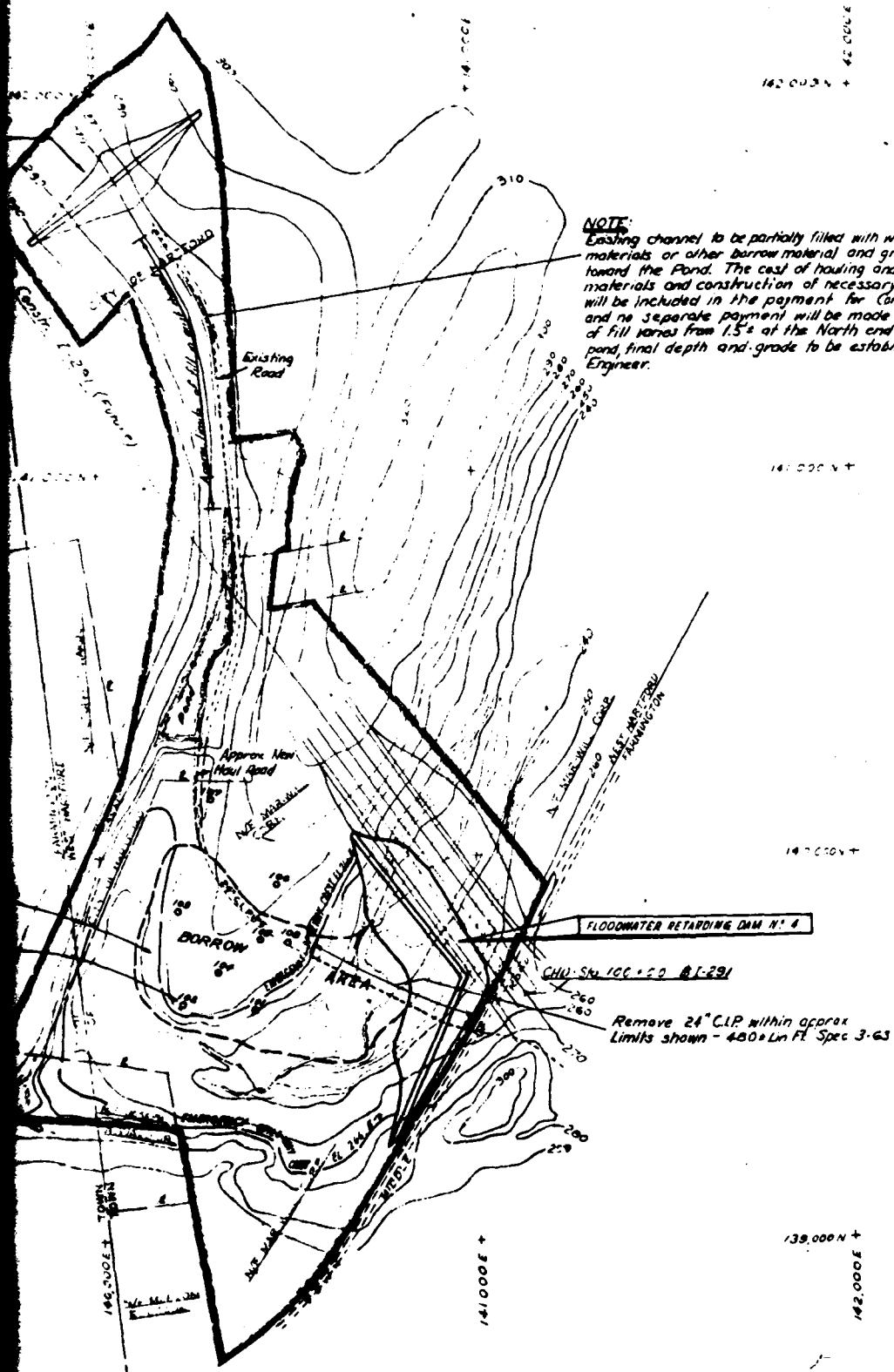
SEE SHEET 9  
FOR LOGS OF TEST HOLES

FLOODWATER AREA

CHD. SW. 1/4 - 2.2'

Remove Limits of

14,000'

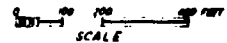


**NOTE:**  
Existing channel to be partially filled with waste excavated materials or other borrow material and graded to drain toward the Pond. The cost of hauling and grading of materials and construction of necessary haul roads will be included in the payment for Common Excavation and no separate payment will be made therefor. Depth of fill varies from 1.5' at the North end to 0.0' at the pond, final depth and grade to be established by the Engineer.

**LEGEND**

- 001 SOILS INVESTIGATION DRILL HOLE
- APPROX. PROPERTY LINE
- 140,000 PLANE COORDINATES OF MDC GRID SYSTEM
- 1-291 FUTURE INTERSTATE HIGHWAY
- TAKING LINE

**AS-BUILT**



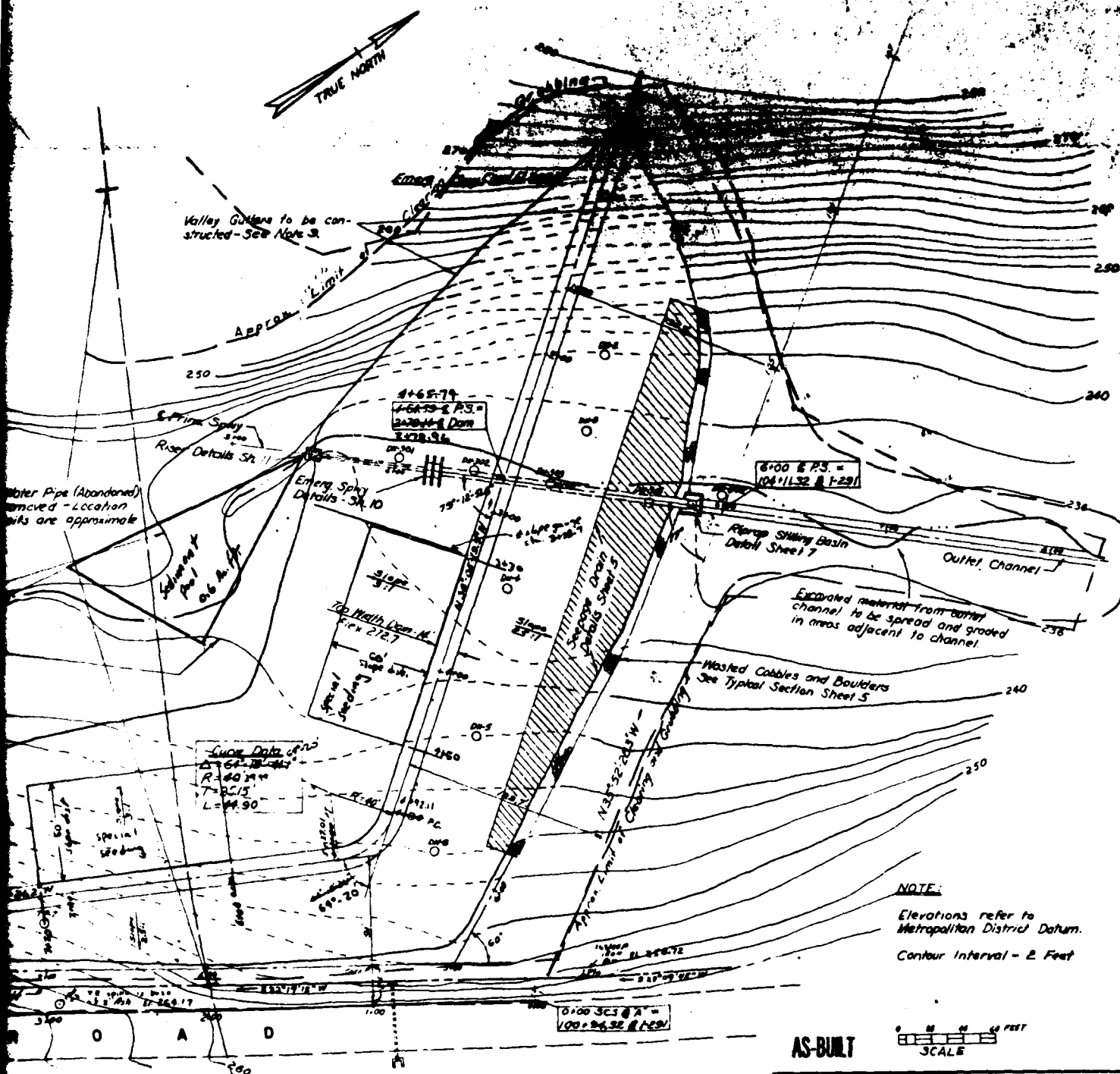
**SOUTH BRANCH PARK RIVER WATERSHED PROJECT  
FLOODWATER RETARDING DAM NO. 4  
BURNT HILL RESERVOIR  
WEST HARTFORD, CONN.  
PLAN OF STORAGE AND BORROW AREAS  
U.S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE**

Designed by <b>R. J. PERRYMAN</b> Drawn	Date	Approved by	File
Checked		Drawn by	
Drawn by		Checked	
Drawn by		Checked	

No.	Gr.	Description	Date
1	RTF	Add Notes	4/65
2	RTF	Remove 24" CIP within approx limits shown - 480' L x 15' W	3-63

Sheet No. 2 of 2  
Drawing No. **CN-421-P**





**SOUTH BRANCH PARK RIVER WATERSHED PROJECT**  
**FLOODWATER RETARDING DAM NO 4**  
**BURNT HILL RESERVOIR**  
**WEST HARTFORD, CONN.**  
**PLAN OF DAM SITE**

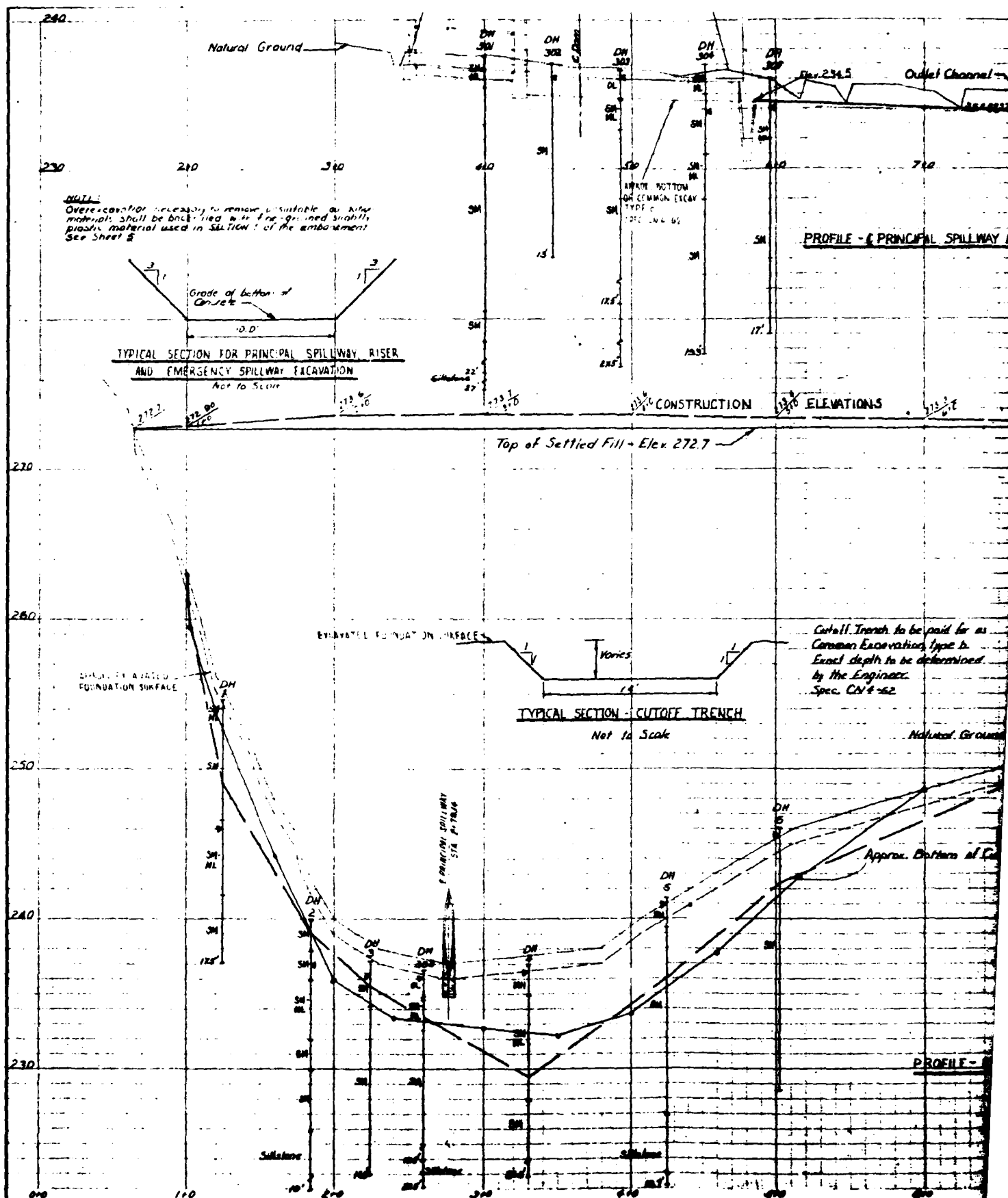
**U. S. DEPARTMENT OF AGRICULTURE**  
**SOIL CONSERVATION SERVICE**

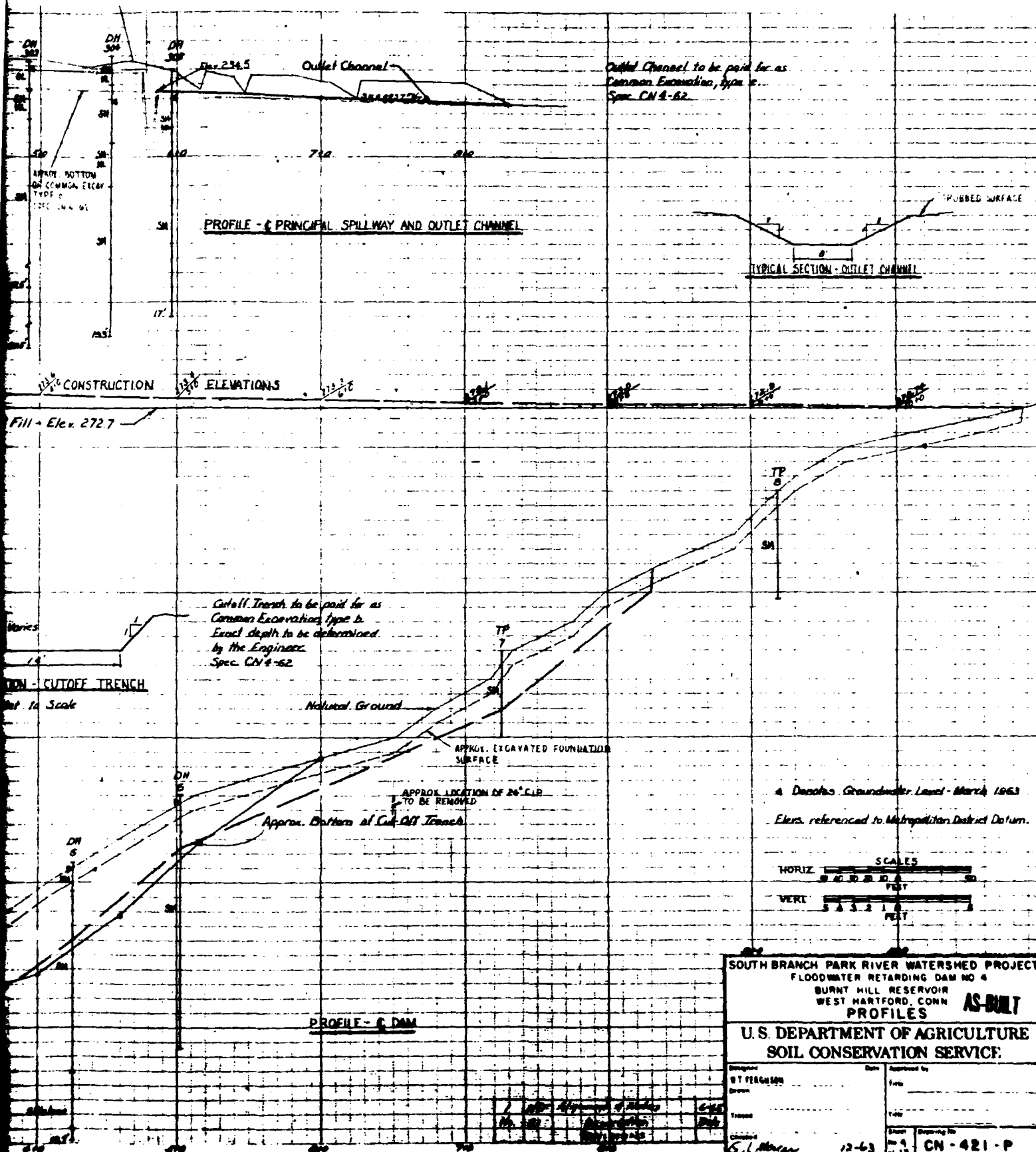
Drawn by **H. FARRINGTON** Date **11-65**  
 Checked by **...** Date **...**  
 Approved by **...** Date **...**

Project No. **3** Drawing No. **CN-421-P**

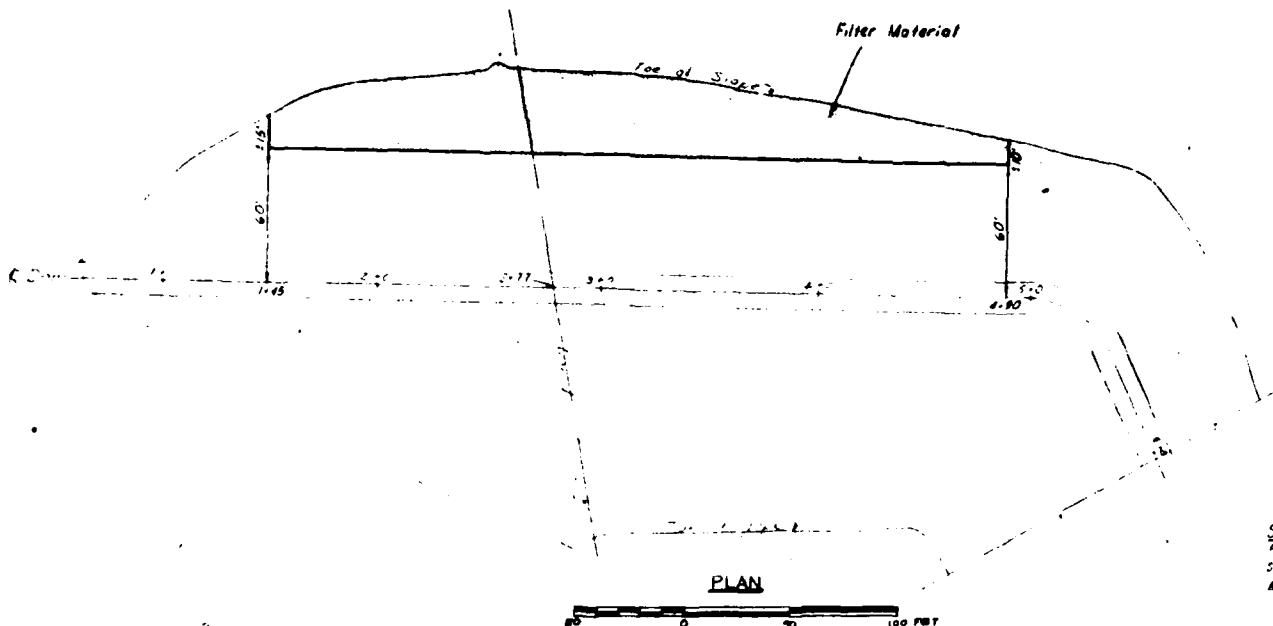
1	No	WTR	Alignment & Notes	C/S
			Description	Date
			REVISIONS	

Contour 1:291  
(Future)

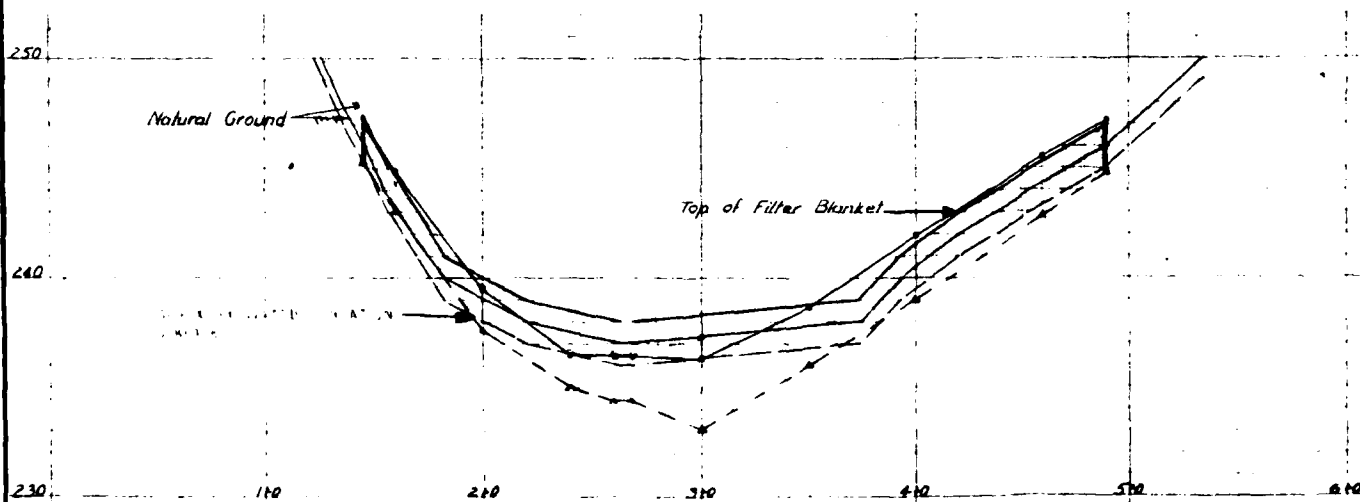




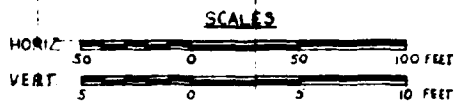




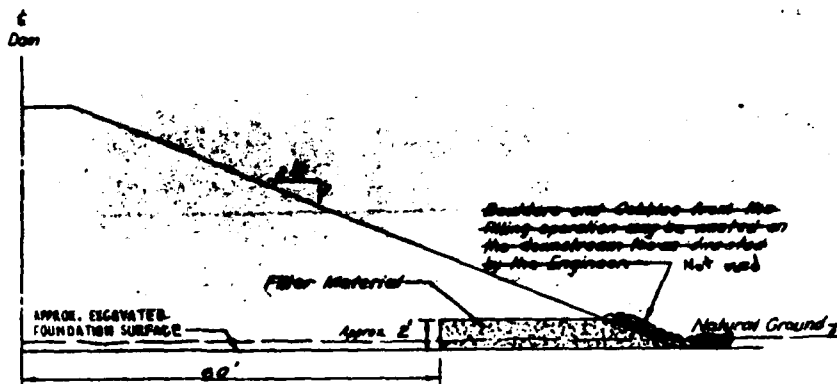
SECTION 1  
FINE GRAINED  
SLIGHTLY PLASTIC  
BY THE LOWER



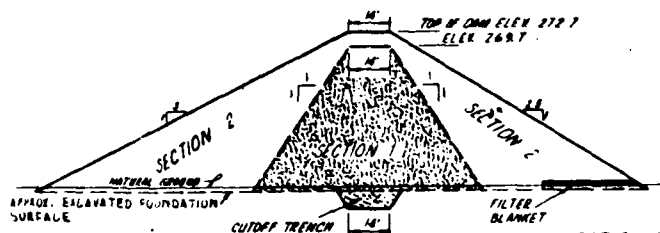
PROFILE ALONG CENTERLINE LIMIT OF FILTER BLANKET



Filter Material



TYPICAL SECTION SHOWING FILTER BLANKET  
Not to Scale

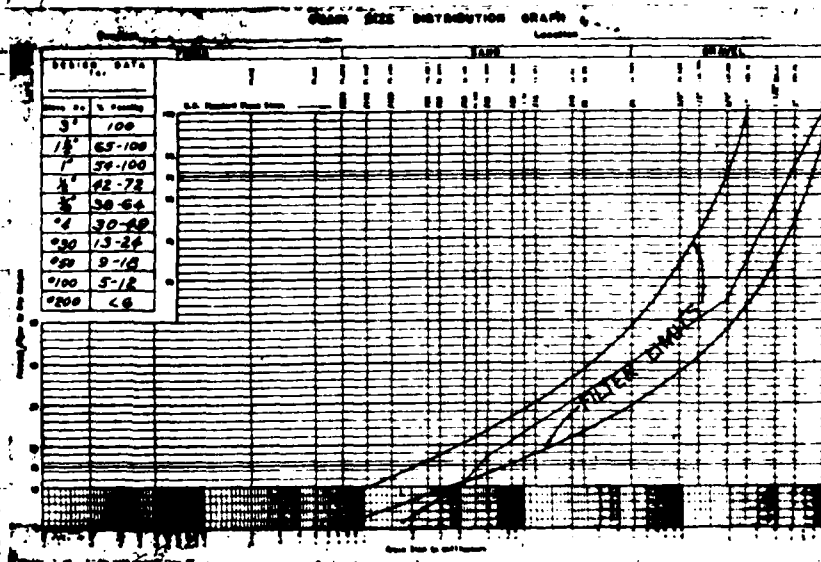


TYPICAL SECTION OF DAM  
NOT TO SCALE

SECTION 1 CLASS 'B-2' CONSTRUCTION  
FINE GRAINED SANDY MATERIAL (SM)  
SLIGHTLY PLASTIC REPRESENTED BY THE LOWER 3' PORTION 'N'

ON 104 ON 105 & ON 302  
UTILIZE THIS MATERIAL AS FAR  
AS IT IS AVAILABLE, BEGINNING  
IN BOTTOM OF CUTOFF TRENCH  
AND WORKING UPWARD

SECTION 2 CLASS 'B-2' COMP  
FINE GRAINED SANDY MATERIAL (SM, SP)  
REPRESENTED BY THE LOGS OF  
TEST HOLES 102, 04 & 105

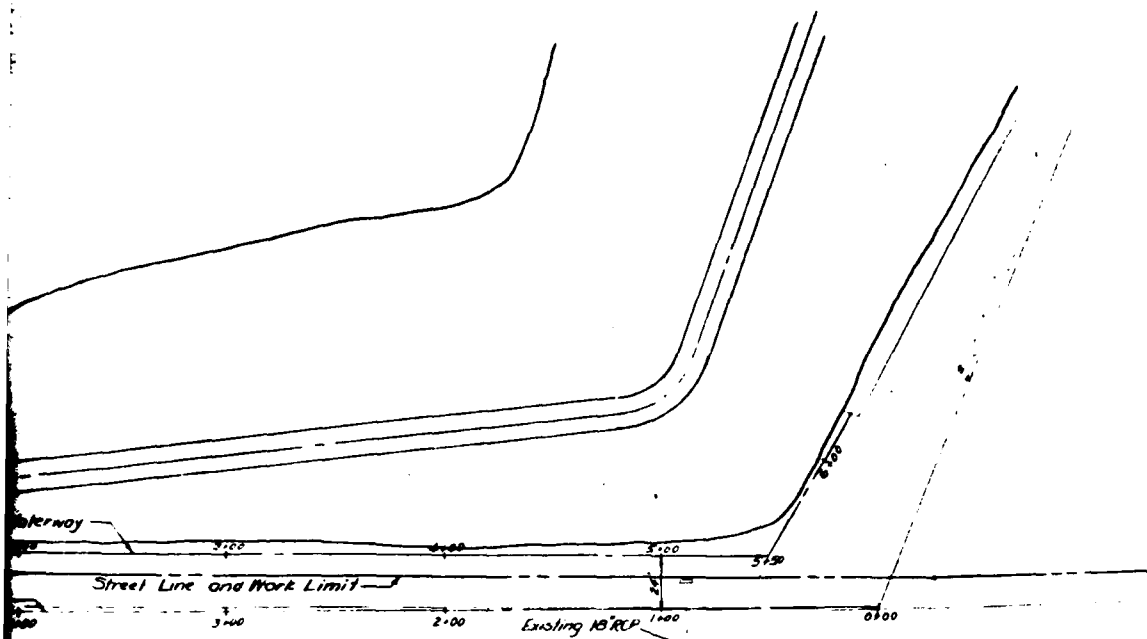


SOUTH BRANCH PARK RIVER WATERSHED PROJECT  
FLOODWATER RETARDING DAM NO. 4  
AS-BUILT  
BURNETT HILL RESERVOIR  
WEST HARTFORD, CONN.  
SEEPAGE DRAIN DETAILS  
U.S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

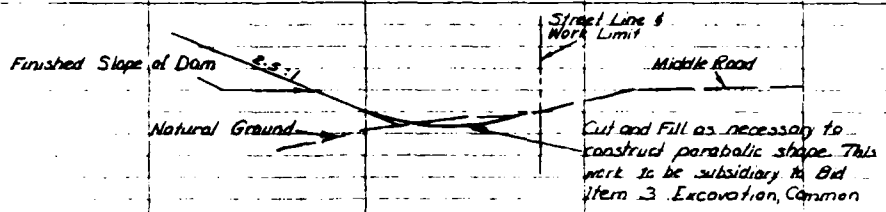
No.	By	Description	Date
1	WTP	Filter Details	4/65
REVISIONS			

Designed by B. T. FERGUSON	Drawn by T. H. H.
Checked by G. L. Moore	Drawn by T. H. H.
Sheet No. 5 of 12	
Drawing No. CN-421-P	

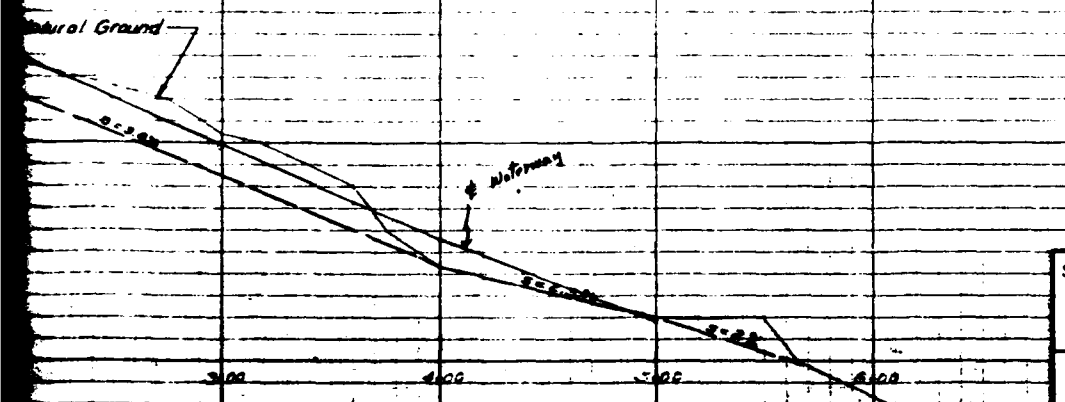




PLAN  
 0 20 40 60 FT.  
 SCALE

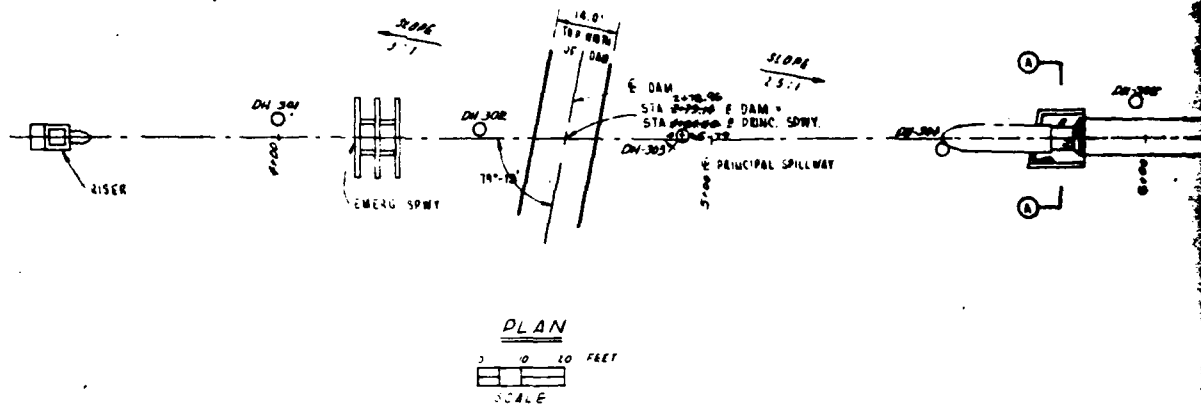


TYPICAL SECTION OF WATERWAY  
 NOT TO SCALE



AS-BUILT

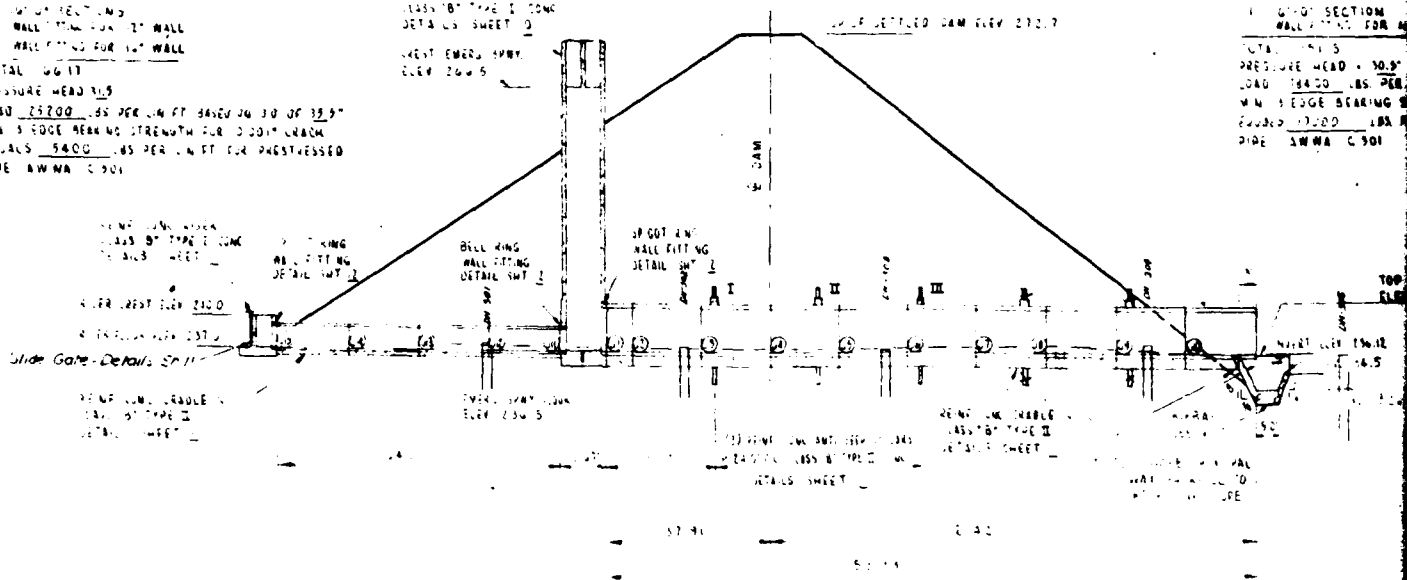
SOUTH BRANCH PARK RIVER WATERSHED PROJECT FLOODWATER RETARDING DAM NO. 4 BURNET HILL RESERVOIR WEST HARTFORD, CONN.			
PLAN - PROFILE OF WATERWAY			
U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE			
Designed by N.T. FERGUSON	Date 6-65	Approved by [Signature]	Date 6-65
Drawn by [Signature]	Checked by [Signature]	Reviewed by [Signature]	Drawn by [Signature]
Sheet No. 1 of 1			Project No. CN-421-P



30" DIA REINF CONC WATER PIPE  
4' DIA REIN CONC  
1' WALL FITTING FOR 1" WALL  
1' WALL FITTING FOR 1" WALL  
TOTAL 06.11  
PRESSURE HEAD 115  
LOAD 25200 LB PER LIN FT BASED ON 30 OF 35.5"  
MIN 3 EDGE BEARING STRENGTH FOR 3000' GRADE  
EQUALS 5400 LB PER LIN FT FOR POSTSTRESSED  
PIPE AWWA C 301

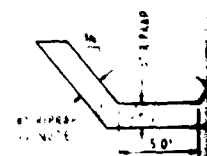
NO CONC EMERG SPWT  
LAST OF TYPE I CONC  
DETAILS SHEET 0  
WEST EMERG SPWT  
ELEV 204.5

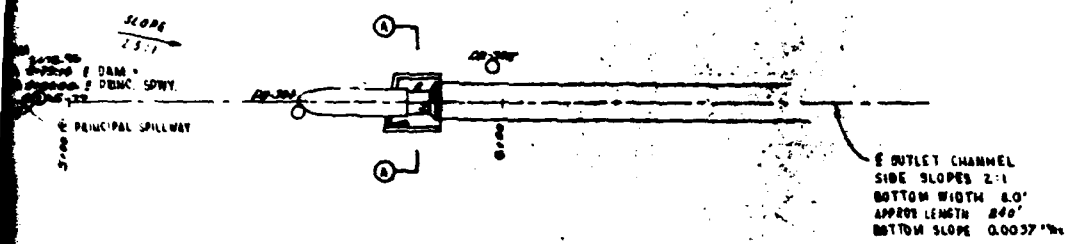
30" DIA REINF CONC WATER  
4' DIA REIN CONC  
1' WALL FITTING FOR 1" WALL  
1' WALL FITTING FOR 1" WALL  
TOTAL 06.11  
PRESSURE HEAD 115  
LOAD 25200 LB PER  
MIN 3 EDGE BEARING  
EQUALS 5400 LB  
PIPE AWWA C 301



PROFILE ALONG C OF PRINCIPAL SPILLWAY  
FEET SHEET 0 FOR PROFILE OF ORIGINAL GROUND LINE & TEST PIT

NO WALL BE REIN  
LAPPED FROM A MAX SIZE OF  
5' TO A MIN SIZE OF 4' &  
WALL BE PLACED WITH ITS  
LARGEST DIMENS ON VERTICAL





60" DIA. REINFORCED CONCRETE WATER PIPE  
 9 1/2' SECTIONS  
 1 6" DIA. SECTION  
 WALL FITTING FOR 12" WALL  
 TOTAL 101.5  
 PRESSURE HEAD = 10.5'  
 LOAD = 16400 LBS. PER LIN. FT. BASED ON O.D. OF 70.75"  
 MIN. 3 EDGE BEARING STRENGTH FOR 0.001" CRACK  
 EQUALS 17200 LBS PER LIN. FT. FOR PRESTRESSED  
 PIPE ANMA C 501

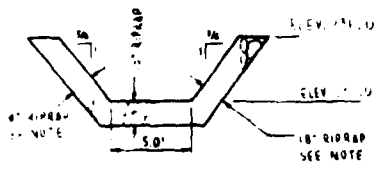
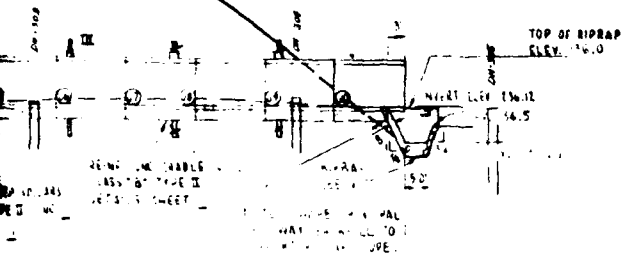
STATION	DISTANCE FROM EMERG. SPWY WALL	INVERT ELEV. OF 60" DIA. PIPE	NO.
1-1	0.33	236.50	
1-2	6.33	236.48	
1-3	22.33	236.44	
1-4	38.33	236.40	
1-5	54.33	236.36	
1-6	70.33	236.32	
1-7	86.33	236.28	
1-8	102.33	236.24	
1-9	118.33	236.20	
1-10	134.33	236.16	
CUT-1	150.33	236.12	

SLOPE = .0037

STATION	DISTANCE FROM EMERG. SPWY WALL	INVERT ELEV. OF 30" DIA. PIPE	NO.
1	25.16	236.44	
2	49.16	236.38	
3	73.16	236.32	

STATION	DISTANCE FROM EMERG. SPWY WALL	INVERT ELEV. OF 30" DIA. PIPE	NO.
1	0	236.50	
2	15.67	236.63	
3	31.67	236.75	
4	47.67	236.88	
5	64.00	237.00	

**NOTE:**  
 ABOVE DIMENSIONS AND CONCRETE PIPE LENGTHS ARE BASED ON NOMINAL SIZE AND DO NOT INCLUDE LEAP.



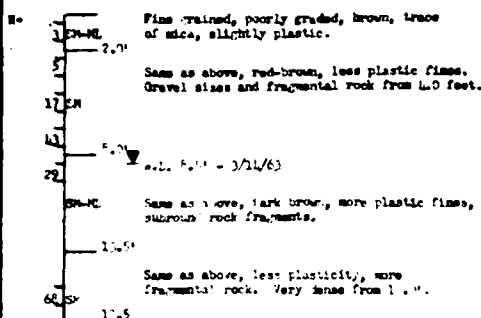
SECTION AA

AS-BUILT

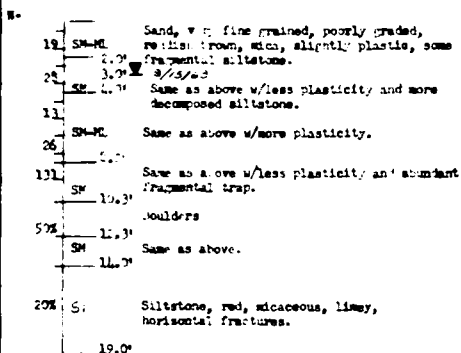
SOUTH BRANCH PARK RIVER WATERSHED PROJECT FLOODWATER RETARDING DAM NO. 4 BURNT HILL RESERVOIR WEST HARTFORD, CONN. <b>PLAN - PROFILE OF PRINCIPAL SPILLWAY</b> U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE			
Designer <b>G. J. Mencer</b> Check <b>H. T. Browning Jr.</b> Title <b>W. A. N. Good</b>	Date <b>12-60</b> Notes <b>12-60</b> Scale <b>1" = 20'</b>	Project No. <b>12-60</b> Drawing No. <b>12-60</b> Sheet No. <b>12-60</b>	
Revision <b>12-60</b> Description <b>12-60</b>		Project No. <b>12-60</b> Drawing No. <b>12-60</b> Sheet No. <b>12-60</b>	

No.	NTF	Station	Description	Date
1	NTF	Station	Description	Date
2	NTF	Station	Description	Date
3	NTF	Station	Description	Date
4	NTF	Station	Description	Date
5	NTF	Station	Description	Date
6	NTF	Station	Description	Date
7	NTF	Station	Description	Date
8	NTF	Station	Description	Date
9	NTF	Station	Description	Date
10	NTF	Station	Description	Date

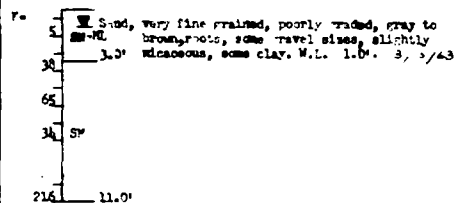
DN-2, C/L Sta. 1+25, Elev. 234.6



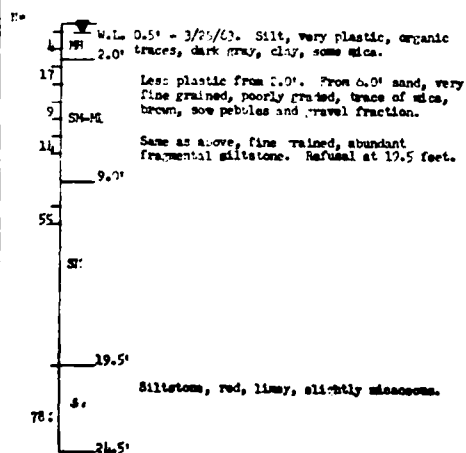
DN-2, C/L Sta. 1+35, Elev. 239.0



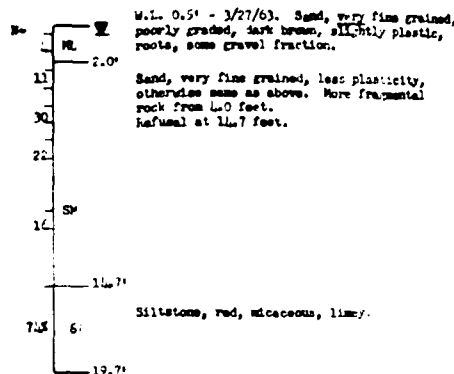
DN-3, C/L Sta. 1+25, Elev. 237.2



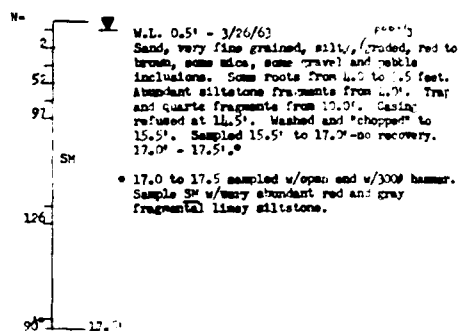
DN-4, C/L Sta. 1+30, Elev. 236.2



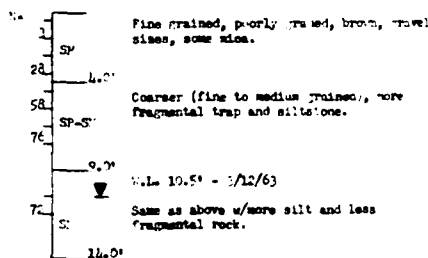
DN-5, C/L Sta. 1+25, Elev. 241.4



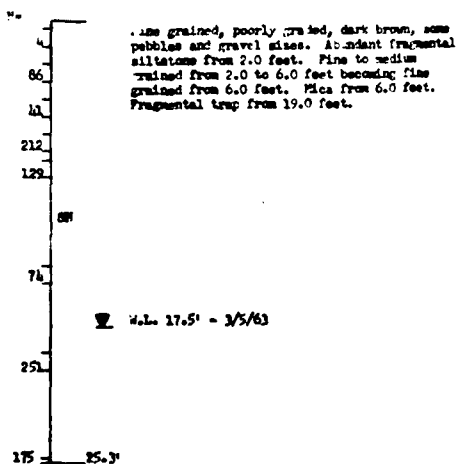
DN-6, C/L Sta. 5+03, Elev. 244.1



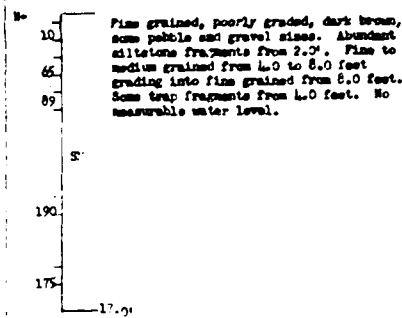
DN-101, Elev. 245.1



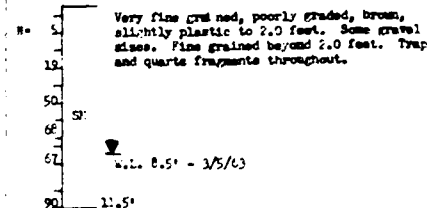
DN-102, Elev. 274.9



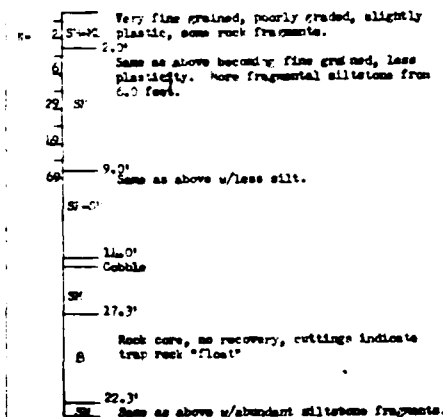
DN-103, Elev. 272.3



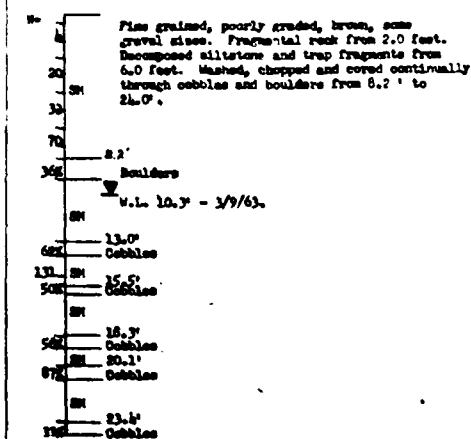
DN-104, Elev. 276.1



DN-105, Elev. 277.1

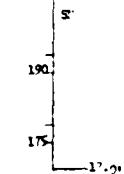


DN-106, Elev. 281.1



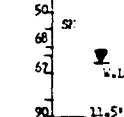
# BN-103, Elev. 273.2

Very fine grained, poorly graded, dark brown, some pebble and gravel sizes. Abundant siltstone fragments from 2.0'. Fine to medium grained from 4.0 to 8.0 feet grading into fine grained from 8.0 feet. Some trap fragments from 4.0 feet. No measurable water level.



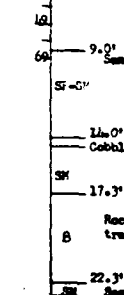
# BN-104, Elev. 276.1

Very fine grained, poorly graded, brown, slightly plastic to 2.0 feet. Some gravel sizes. Fine grained beyond 2.0 feet. Trap and quartz fragments throughout.



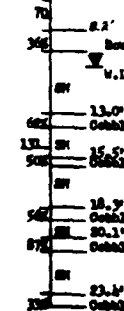
# BN-105, Elev. 277.2

Very fine grained, poorly graded, slightly plastic, some rock fragments. Same as above becoming fine grained, less plasticity. More fragmental siltstone from 6.0 feet.



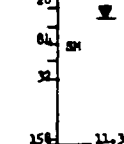
# BN-106, Elev. 283.1

Fine grained, poorly graded, brown, some gravel sizes. Fragmental rock from 2.0 feet. Decomposed siltstone and trap fragments from 6.0 feet. Washed, chopped and cored continually through cobbles and boulders from 8.2' to 24.0'.



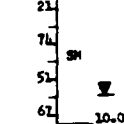
# BN-107, Elev. 276.1

Very fine grained, poorly graded, brown, low plasticity, some gravels.



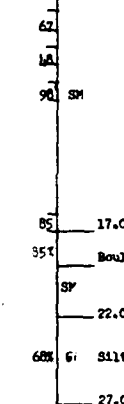
# BN-108, Elev. 274.7

Very fine grained, poorly graded, low plasticity, some clay.



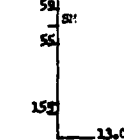
# BN-109, Elev. 237.5

Very fine grained, poorly graded, dark brown, slightly plastic.



# BN-110, Elev. 237.1

Very fine grained, poorly graded, dark brown, some mica, siltstone and decomposed trap fragments from 4.0 feet. Refusal at 13.0 feet.



# LEGEND

## TEST HOLE NUMBERING SYSTEM

Centerline of dam	1 - 99
Borrow area	101 - 199
Emergency spillway	201 - 299
Centerline of outlet structure	301 - 399
Stream channel	401 - 499
Relief wells	501 - 599
	601 - 699
	701 - 799

## UNIFIED SOIL CLASSIFICATION SYSTEM SYMBOLS

GM	Well graded gravels; gravel-sand mixtures
GP	Poorly graded gravels
GM	Silty gravels; gravel-sand-silt mixtures
GC	Clayey gravels; gravel-sand-clay mixtures
GW	Well graded sands; sand-gravel mixtures
SP	Poorly graded sands
SM	Silty sands; sand-silt mixtures
SC	Clayey sands; sand-clay mixtures
ML	Silt; silty, v. fine sands; sandy or clayey silt
CL	Clays of low to medium plasticity; silty, sandy or gravelly
CH	Clays of high plasticity; fat clays
OH	Elastic silts; micaceous or diatomaceous silts
OL	Organic silts and organic silty clays of low plasticity
OH	Organic clays or silts of medium to high plasticity

## WETPACK SYMBOLS

B	Basalt	Sc	Schist
Gn	Gneiss	Sh	Shale
Gr	Granite	Sl	Siltstone
Ls	Limestone	Ss	Slate
M	Marble		Sandstone

## KEY TO "WELL HOLE (W) LOGS

N	Number of blows required for 1-ft. standard penetration, using 2.0" O.D. split barrel sampler, 140 lb. hammer, and 30" drop. ASTM D 1586.
9.0	Depth in hole (ft.)
CL	Unified Soil Classification Symbol
12.0	
17.0	Depth in hole
73%	Percent rock core recovery in each drill run
50%	
90%	La Bedrock symbol

ML (date) Water Level

Vertical scale 1" = 5'

All soil and rock descriptions and classifications were determined by visual examination.

Location of test holes are shown on sheets

AS-BUILT

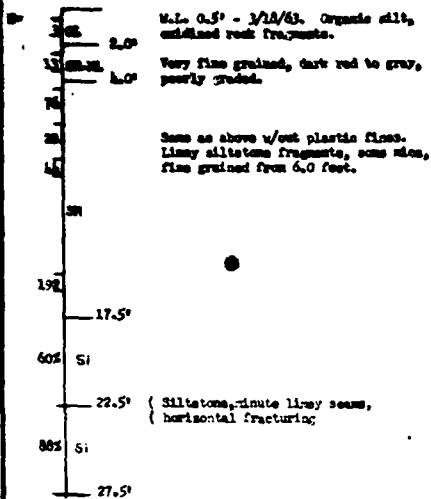
SOUTH BRANCH PARK RIVER WATERSHED PROJECT  
FLOODWATER RETARDING DAM NO 4  
BURNT HILL RESERVOIR  
WEST HARTFORD, CONN.  
LOGS OF TEST HOLES

U.S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

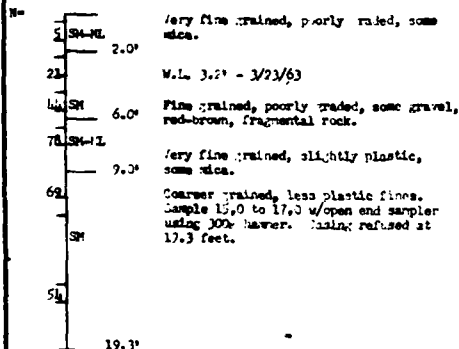
Drawn by <b>M.A. Brown</b>	Date <b>7-68</b>	Approved by <b>[Signature]</b>
Checked by <b>M.A. Brown</b>	Date <b>7-68</b>	Sheet No. <b>6</b> of <b>12</b>
		Record No. <b>BN-421-P</b>



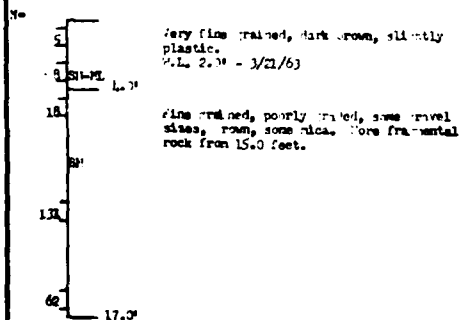
TH-303, Elev. 236.6



TH-304, Elev. 237.0



TH-305, Elev. 236.0



TP-7 (Backhoe), C/L Sta. 7+25, Elev. 256

0.0 - 0.7' : Topsoil (SH)  
 0.7 - 6.0' : Sand, fine grained, poorly graded, brown, some gravel sizes. Cobbles estimated less than 5%. Hardpan at 3.0 feet. Very honey from 3.0 to hole bottom at 6.0 with abundant fragmental trap and siltstone.

TP-8 (Backhoe), C/L Sta. 9+16, Elev. 270

0.0 - 1.0' : Topsoil (SH)  
 1.0 - 7.5' : Sand, fine grained, poorly graded, brown, some mica. Very fine grained from 4.5 feet. Very moist at 7.0 feet. Cobbles, fragmental siltstone and trap common throughout.

TP-102 (Backhoe)

0.0 - 0.3' : Topsoil (SH)  
 0.3 - 6.4' : Sand, fine grained, poorly graded, brown, moist, no free water, siltstone fragments throughout.

Sample taken 3.0 to 6.0 feet.

TP-104 (Backhoe)

0.0 - 0.3' : Topsoil (SH)  
 0.3 - 6.5' : Less silty sand as previously described.

Sample taken 3.0 to 6.0 feet.

TP-105 (Backhoe)

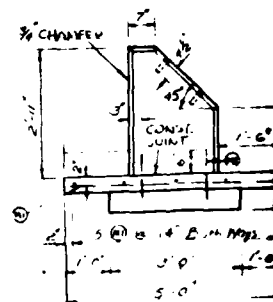
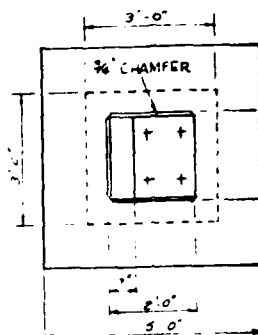
0.0 - 0.6' : Topsoil (A)  
 0.6 - 7.0' : Same silty sand as previously described. Fragmental rock common throughout.

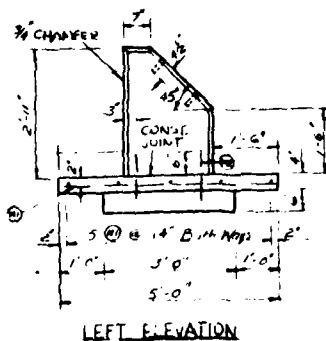
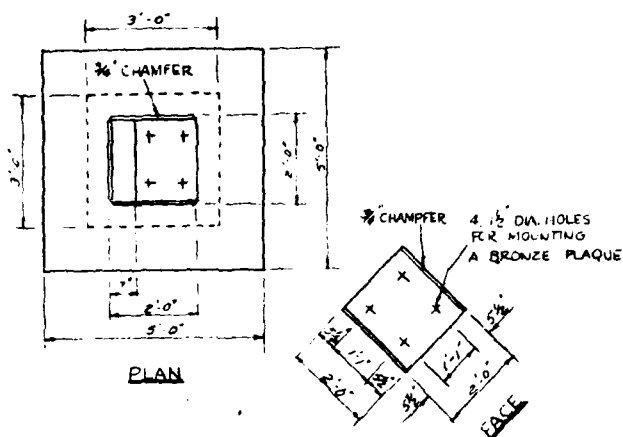
Sample taken 3.0 to 6.0 feet.

TP-107 (Backhoe)

0.0 - 0.3' : Topsoil (SH)  
 0.3 - 6.0' : Same silty sand as previously described.

Boulders from 3.3 feet.



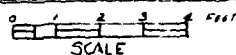


MARK	LOCATION	QUAN	SIZE	LENGTH	TYPE	TOTAL FT
M-1	MONUMENT	10	3	4'-10"	STR	48.33
M-2		4	4	1'-0"	STR	4.00
WEIGHT OF SIZE NO. 3 STEEL = 18.17 LBS						
WEIGHT OF SIZE NO. 4 STEEL = 2.67 LBS						
TOTAL CLASS 'B' CONCRETE = 0.84 CY						

#### NOTES:

1. LOCATION OF CONCRETE MONUMENT WILL BE MADE BY THE ENGINEER IN THE FIELD.
2. CARBORUNDUM - BUDDING FINISH FOR EXPOSED CONCRETE SURFACES.

#### CONCRETE MONUMENT DETAILS



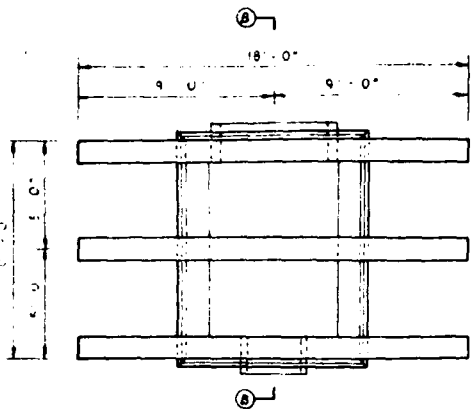
AS-BUILT

SOUTH BRANCH PARK RIVER WATERSHED PROJECT FLOODWATER RETARDING DAM NO. 4 BURNT HILL RESERVOIR WEST HARTFORD, CONN.			
LOGS OF TEST HOLES			
U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE			
INVESTIGATOR	DATE	APPROVED BY	FILE
M. A. Brown	9-63		
NO. 1	9-63	NO. 2	9-63
			CN-421-P

1. WTH Add Mon. Details  
No. By Description Date  
REVISIONS

6/65  
Date

2

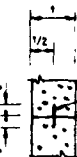


PLAN VIEW

WALLS & R.A. NOT SHOWN

NOTE

1/2" x 4" STEEL PLATE TO BE CONTINUOUS AROUND RISE AT EACH CONSTRUCTION JOINT WELD ALL WELDS IN PLATE

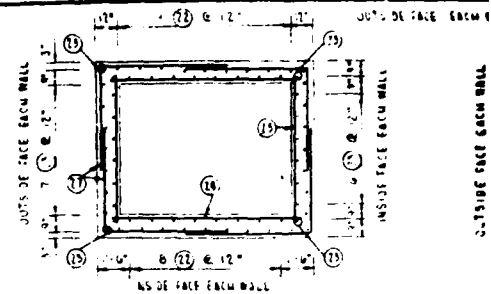


DETAILS OF PLATE CONSTR. JOINT

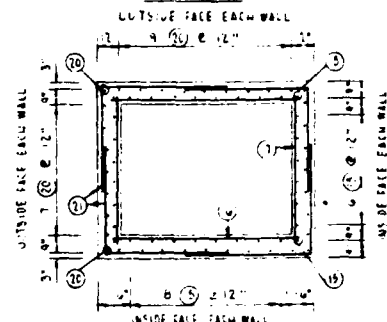


SECTION GG

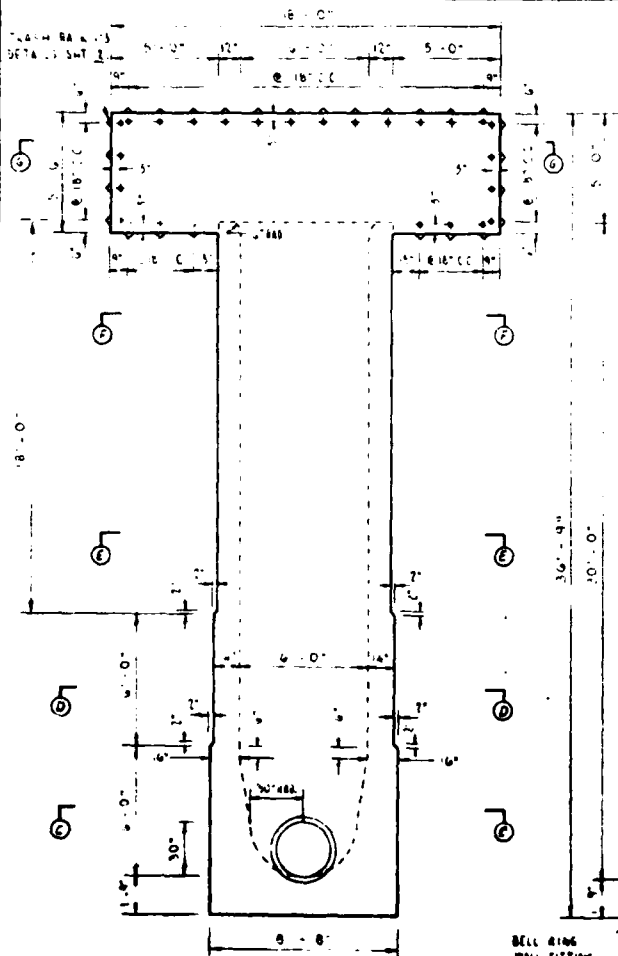
1/2" x 4" STEEL PLATE



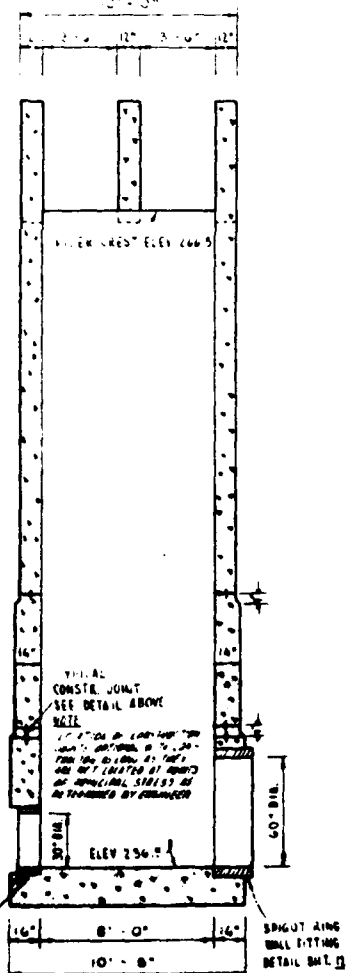
SECTION FF



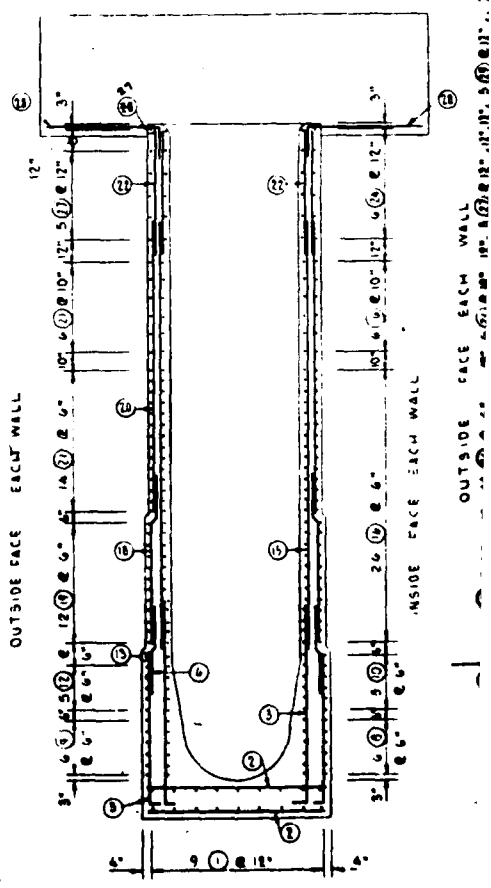
SECTION EE



UPSTREAM ELEVATION

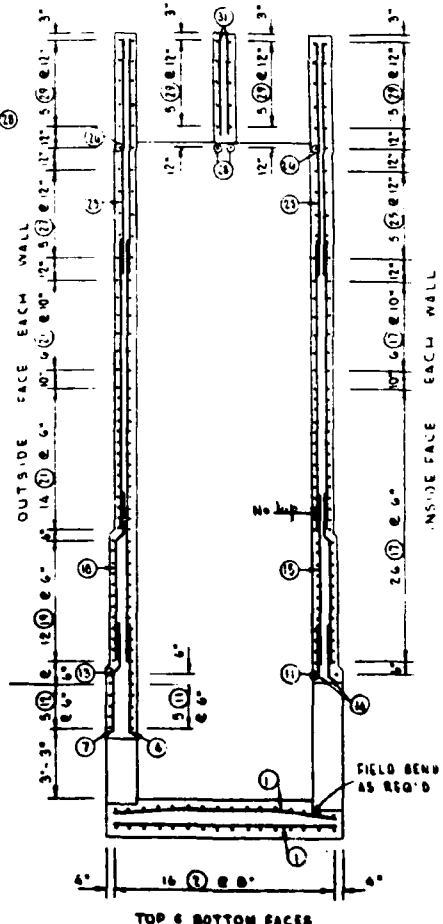
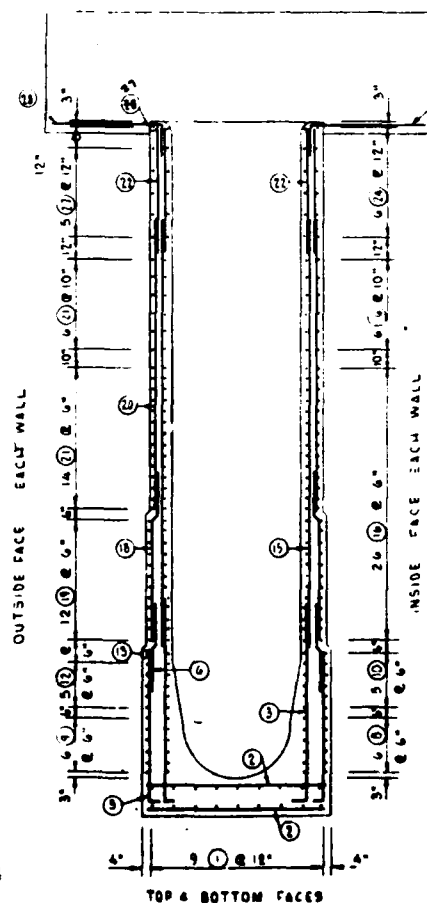
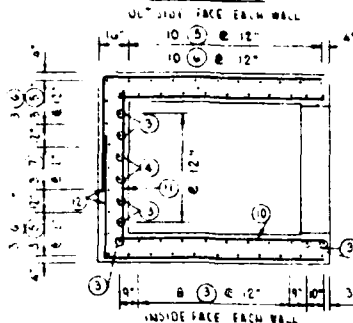
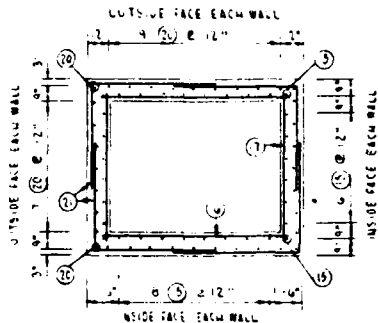
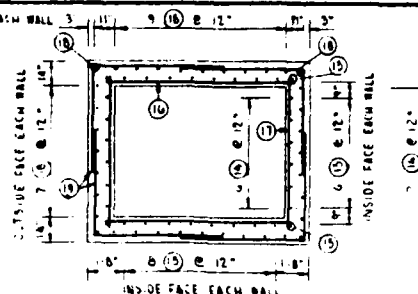
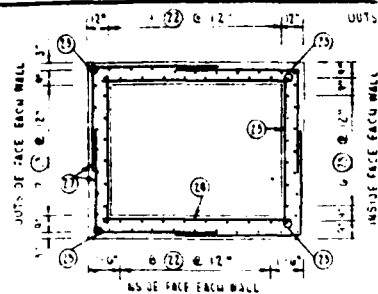


SECTION ALONG E OF RISER

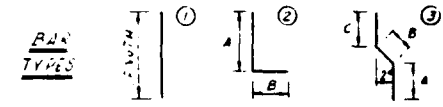


SECTION AA

OUTSIDE FACE EACH WALL  
INSIDE FACE EACH WALL



STEEL SCHEDULE									
NO.	LOCATION	BAR	SIZE	LENGTH	TYPE	A	B	C	TOTAL FT
1	EMERGENCY	15	7	10'-3"	1				154.50
2		32	7	8'-3"	1				264.00
3		26	7	10'-6"	2	9'-9"	0'-9"		218.00
4		2	7	5'-3"	1				10.90
5		26	7	8'-3"	2	7'-6"	0'-9"		214.50
6		26	7	4'-6"	3	2'-3"	0'-8"	7'-0"	117.00
7		3	7	8'-3"	3	3'-0"	0'-3"	2'-0"	15.75
8		12	7	10'-10"	2	9'-4"	1'-6"		190.00
9		12	7	12'-11"	2	10'-5"	2'-8"		253.00
10		10	7	9'-9"	1				87.50
11		7	7	7'-0"	1				49.00
12		10	7	5'-6"	2	10'-3"	5'-3"		155.00
13		4	7	11'-6"	2	6'-2"	5'-3"		84.00
14		15	7	2'-6"	1				31.50
15		32	6	19'-8"	1				637.00
16		24	6	9'-0"	1				576.00
17		64	4	7'-0"	1				848.00
18		36	4	8'-1"	3	5'-10"	0'-8"	7'-0"	291.80
19		48	4	11'-0"	2	5'-0"	6'-0"		528.00
20		36	4	15'-9"	1				645.00
21		80	4	10'-6"	2	4'-9"	5'-9"		840.00
22		34	5	5'-6"	1				187.00
23		34	5	10'-6"	1				357.00
24		12	5	4'-0"	1				108.00
25		10	5	7'-0"	1				70.00
26		4	5	17'-6"	1				88.00
27		21	5	10'-2"	2	5'-7"	4'-7"		323.50
28		18	5	7'-0"	2	5'-7"	1'-5"		86.00
29		30	4	17'-6"	1				575.00
30		64	4	5'-0"	1				576.00
31		7	4	4'-6"	1				54.00
32		8	4	7'-0"	1				56.00



STEEL QUAN - THIS SHEET ONLY - CONC QUAN									
N° 4 BARS	955.9	LIN FT	533.9	LB	CLASS "B" TYPE I	5.2	CU YD		
N° 5 BARS	1259.9	LIN FT	1259.9	LB					
N° 6 BARS	3810.0	LIN FT	3722.0	LB					
N° 7 BARS	1744.3	LIN FT	3565.5	LB					
TOTAL			9081.3	LB					

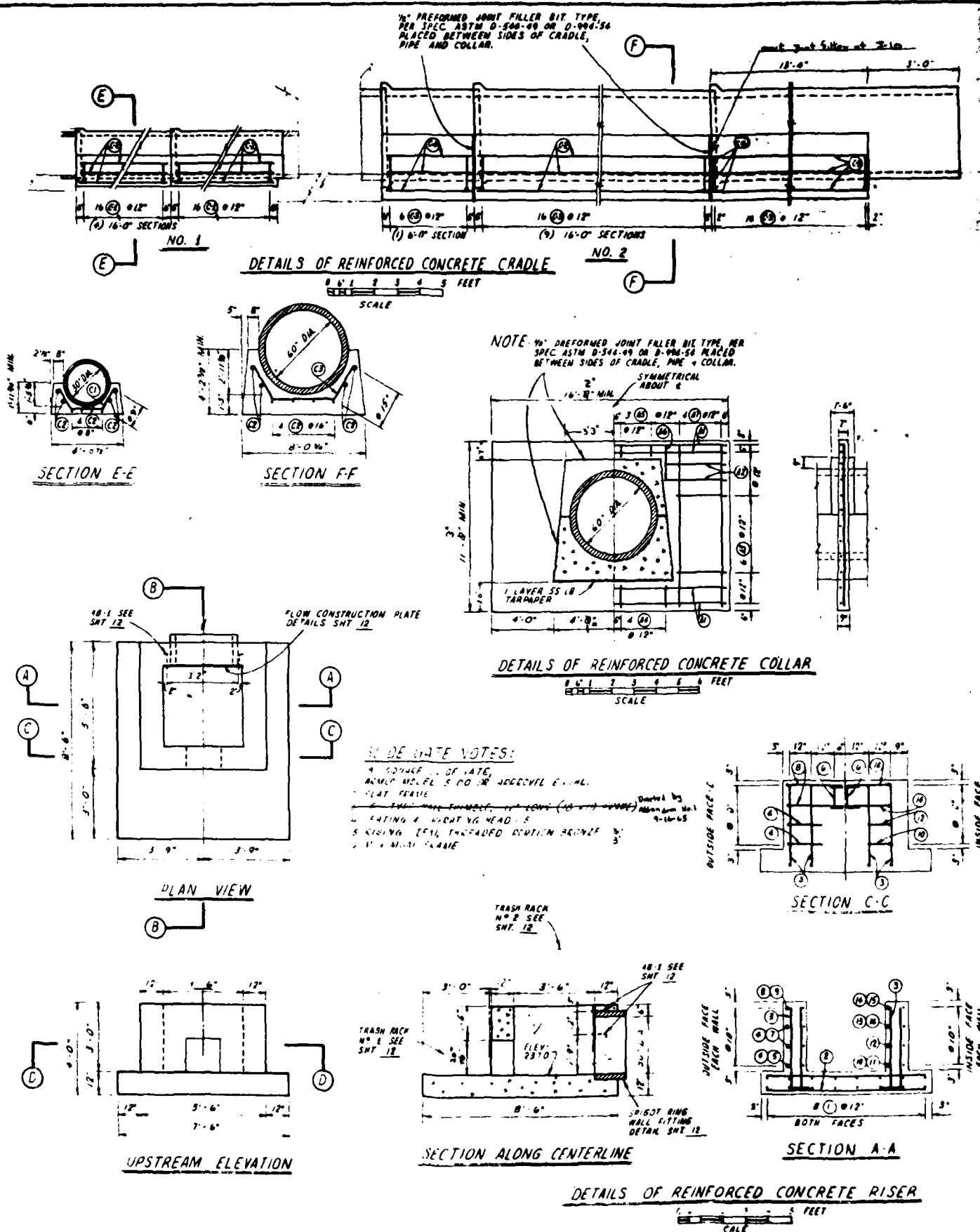
STEEL QUAN - TOTAL FOR PROJECT - CONC QUAN									
N° 4 BARS	3177.7	LIN FT	2611.0	LB	CLASS "B" TYPE I	5.2	CU YD		
N° 5 BARS	1259.9	LIN FT	1259.9	LB	CLASS "B" TYPE II	15.4	CU YD		
N° 6 BARS	3810.0	LIN FT	3722.0	LB					
N° 7 BARS	1744.3	LIN FT	3565.5	LB					
TOTAL			15710.3	LB					

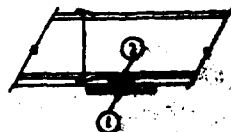
- GENERAL NOTES:**
1. ALL CONCRETE SHALL BE CLASS "B" & OF THE TYPE NOTED
  2. PORTLAND CEMENT TYPE I OR TYPE II WITH AN AIR-ENTRAINING ADMIXTURE SHALL BE USED
  3. ALL REIN STEEL TO BE LAPPED A MIN OF 30 BAR DIA
  4. ALL REIN STEEL PLACED IN CONCRETE POURED AGAINST THE GROUND SHALL HAVE A MIN OF 3" CLEAR COVER WHERE FORMS ARE USED BARS SHALL HAVE A MIN OF 2" CLEAR COVER
  5. ALL EXPOSED EDGES OF CONCRETE TO HAVE A 3/4" CHAMFER UNLESS OTHERWISE NOTED



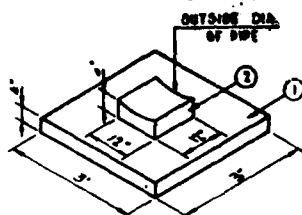
AS-BUILT

SOUTH BRANCH PARK RIVER WATERSHED PROJECT FLOODWATER RETARDING DAM NO 4 BURNT HILL RESERVOIR WEST HARTFORD, CONN			
EMERGENCY SPILLWAY DETAILS			
U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE			
Designed by H.T. BROWNING, A.	Drawn by T.M.	Checked by T.M.	Approved by T.M.
Drawing No. CN-421-P		Sheet 10 of 12	





### CONCRETE-PIPE SUPPORT BLOCKS



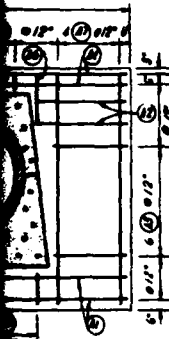
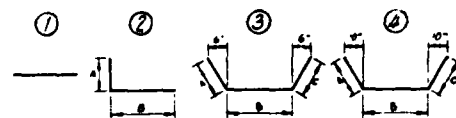
ISOMETRIC OF BLOCKS ① & ②

LOCATION	SIZE	LENGTH	A	B	C
1. MAIN	16	4	3-0	1-0	1-0
2	10	4	3-0	1-0	1-0
3	16	4	3-0	1-0	1-0
4	6	4	3-0	1-0	1-0
5	6	4	3-0	1-0	1-0
6	6	4	3-0	1-0	1-0
7	16	4	3-0	1-0	1-0
8	6	4	3-0	1-0	1-0
9	6	4	3-0	1-0	1-0
10	6	4	3-0	1-0	1-0
11	6	4	3-0	1-0	1-0
12	6	4	3-0	1-0	1-0
13	6	4	3-0	1-0	1-0
14	14	4	3-0	1-0	1-0
15	6	4	3-0	1-0	1-0

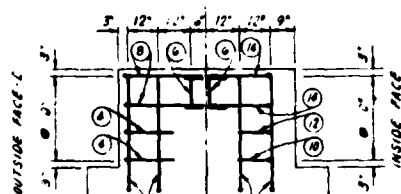
21	COLLINS	60	4	75-6	1			100-00
22		70	4	6-3	1			50-00
23		70	4	3-6	1			50-00
24		70	4	1-8	1			50-00
25		100	4	0-9	1			50-00
26		5	4	8-8	1			50-00
27		20	4	10-6	1			50-00

C1	CRAB	66	4	5-0	3	1-6	2-0	1-6	220.00
C2		106	6	15-0	1				147.00
C3	160	4	9-0	4	2-6	0-0	2-0		100.00
C4		0	6	5-6	1				6.00
C5		8	6	13-0	1				104.00
C6		8	6	4-0	1				32.00

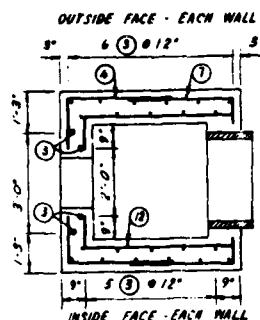
## BAR TYPES



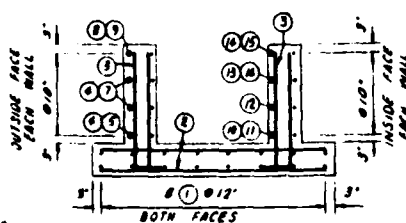
### CASTED CONCRETE COLLAR



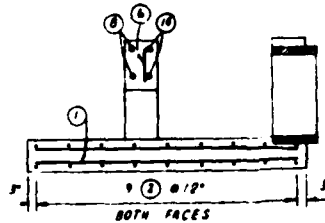
SECTION C-C



SECTION D-D



SECTION A-A



SECTION B-B

## STEEL QUAN.

~~246.7~~ ~~1982.1~~  
 No 6 BARS ~~146.7~~ LINF FT ~~1025~~ LBS  
 No 6 BARS ~~146.7~~ LINF FT ~~1025~~ LBS  
~~1742.0~~ ~~2691.6~~  
 TOTAL ~~493.0~~ LBS  
 9679.7

CONCRETE QUANTITY

CLASS "B" TYPE I (41) CULP  
CLASS "B" TYPE II (36) CULP

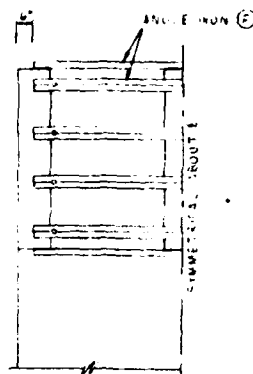
### GENERAL NOTES

1. ALL CONCRETE SHALL BE CLASS "B" & OF THE TYPE NOTED
2. PORTLAND CEMENT TYPE IA OR TYPE I WITH AN AIR-ENTRAINING ADMIXTURE SHALL BE USED.
3. ALL REINF STEEL TO BE LAPPED A MIN. OF 30 BAR DIA.
4. ALL REINF STEEL PLACED IN CONCRETE POURED AGAINST THE GROUND SHALL HAVE A MIN. OF 3" CLEAR COVER WHERE FORMS ARE USED BARS SHALL HAVE A MIN. OF 2" CLEAR COVER
5. ALL EXPOSED EDGES OF CONCRETE TO HAVE A 90° CHAMFER UNLESS OTHERWISE NOTED

## AS-BUILT

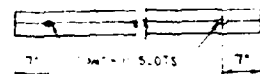
**SOUTH BRANCH PARK RIVER WATERSHED PROJECT  
FLOODWATER RETARDING DAM NO 4  
BURNT HILL RESERVOIR  
WEST HARTFORD, CONN  
CRADLE, COLLAR, BENT & RISER DETAILS  
U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE**

City of origin	State	Registered by
Providence	12-63	100
Origin		
C B FORD	12-63	
Trace		
Class	Year	Donor No
1	11	
2	12	CN-421-P

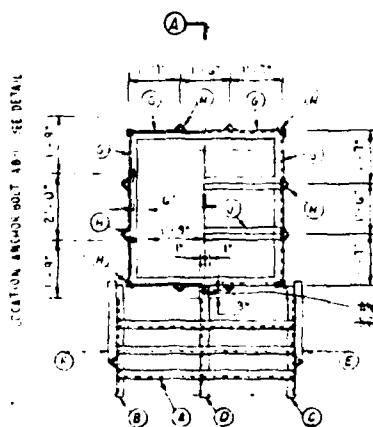


1 2 3 4 FEET

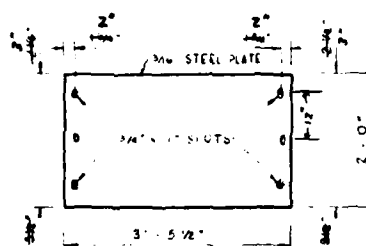
SCALE



ANGLE IRON (R)



SECTION BB

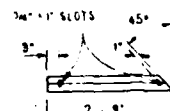


### CONSTRUCTION PLATE DETAILS

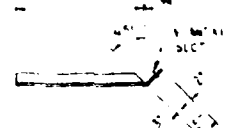


WELDING DETAIL:

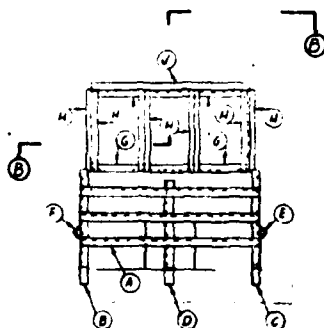
NOTE WELD ALL POINTS OF CONTACT  
BETWEEN ANGLE RUN & ANGLE  
RUN EXCEPT WHERE SHOWN.



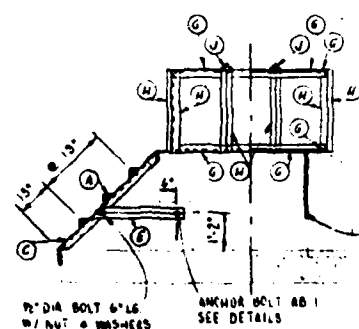
ANGLE IRON E



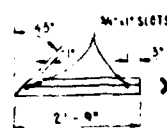
ANGLE IRON (D)



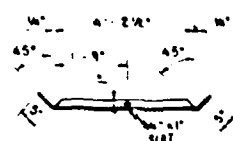
FRONT VIEW



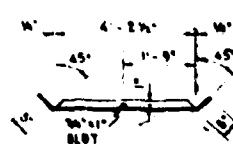
SECTION AA



ANGLE IRON (F)



ANGLE IRON ©



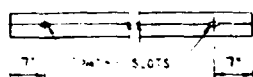
ANGLE IRON ⑥

DETAILS OF TRASH RACKS N°1 & N°2



LOCATION
TRASH BOX Nº 1
TRASH BOX Nº 2
TRASH BOX Nº 3

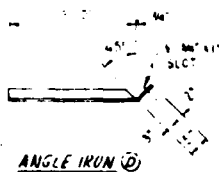
# "L" JOINT DETAIL



ANGLE IRON (K)

## WELDING DETAILS

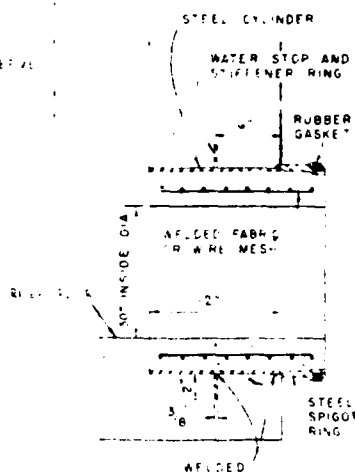
WELD ALL POINTS OF CONTACT BETWEEN ANGLE IRON & ANGLE IRON EXCEPT WHERE SHOWN.



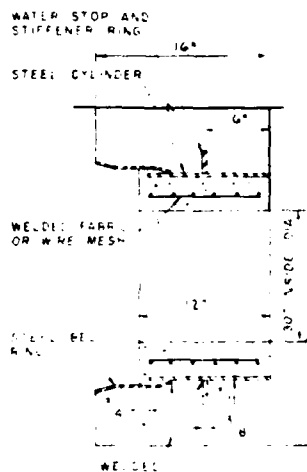
ANGLE IRON (D)

ANGLE IRON (E)

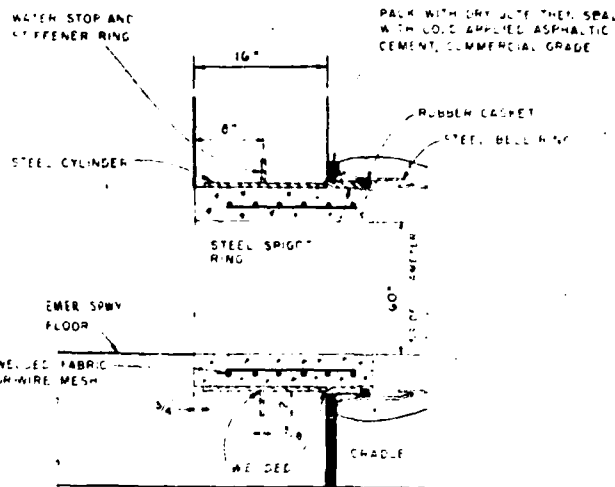
ANGLE IRON (F)



## SPIGOT RING WALL FITTING FOR 12" WALL

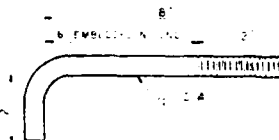


## BELL RING WALL FITTING FOR 16" WALL



PERFORMED BY TOWN OF WEST HARTFORD, CONNECTICUT  
UNDER SUPERVISION OF  
RESIDENT ENGINEER  
U.S.D.A. - 49

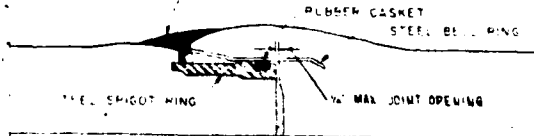
## SPIGOT RING WALL FITTING FOR 16" WALL



## STAINLESS STEEL ANCHOR BOLT, AB-1

SUPPLY WITH NUT AND WASHER

PACK WITH DRY JUTE THEN SEAL WITH COLD APPLIED ASPHALTIC CEMENT, COMMERCIAL GRADE



## DETAIL OF REINFORCED CONCRETE WATER PIPE JOINT

AS-BUILT

LOCATION	ITEM	SIZE	LENGTH	QUANTITY
TRASH RACK NO. 1	ANCHOR BOLT AB-1 W/ NUT & WASHER	1/2" DIA	2'-8"	8
	ANGLE IRON (W/ NUT & WASHERS)	1/2" DIA	0'-6"	2
	ANGLE IRON (W/ NUT & WASHERS)	1/2" DIA	2'-6"	3
	ANGLE IRON (W/ NUT & WASHERS)	1/2" DIA	2'-6"	1
	ANGLE IRON (W/ NUT & WASHERS)	1/2" DIA	2'-6"	1
	ANGLE IRON (W/ NUT & WASHERS)	1/2" DIA	2'-6"	1
TRASH RACK NO. 2	ANCHOR BOLT AB-1 W/ NUT & WASHER	1/2" DIA	2'-8"	4
	ANGLE IRON (W/ NUT & WASHERS)	1/2" DIA	0'-6"	2
	ANGLE IRON (W/ NUT & WASHERS)	1/2" DIA	2'-6"	12
	ANGLE IRON (W/ NUT & WASHERS)	1/2" DIA	2'-6"	2
TRASH RACK NO. 3	ANCHOR BOLT AB-1 W/ NUT & WASHERS	1/2" DIA	2'-8"	8
	ANGLE IRON (W/ NUT & WASHERS)	1/2" DIA	2'-6"	26

SOUTH BRANCH PARK RIVER WATERSHED PROJECT  
FLOODWATER RETARDING DAM NO. 4  
BURNT HILL RESERVOIR  
WEST HARTFORD, CONN.

**TRASH RACK & MISC DETAILS**

U.S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

By: *Geo. J. Moore* 10-68  
H.T. BROWNING, JR. 10-68  
Check: *B. McLeod* 12-68

12 12 CN-421-P



## **APPENDIX C**

### **PHOTOGRAPHS**



C-1, C-2 VIEW OF DAM - LOOKING SOUTH



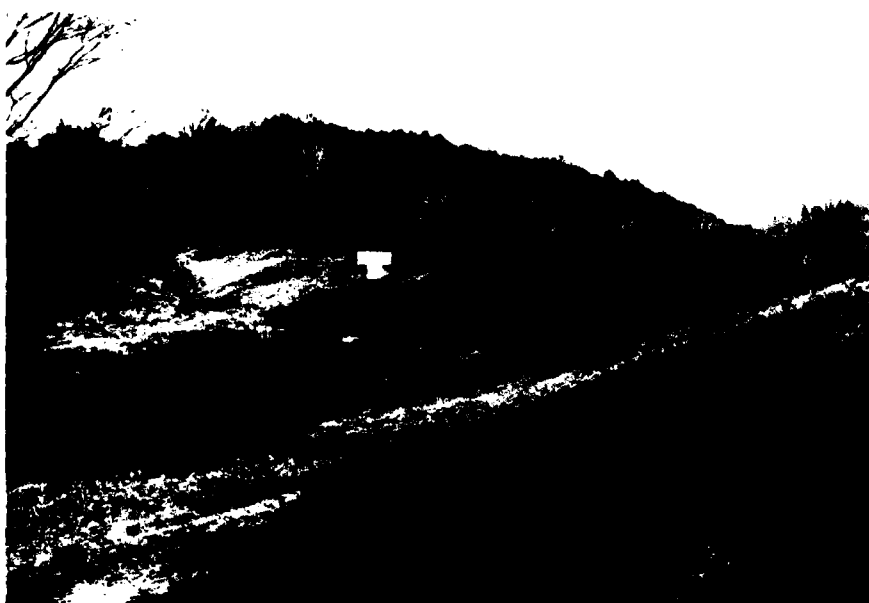
C-3 SOUTH END OF DAM - LOOKING NORTH



C-4 DOWNSTREAM FACE OF SOUTH SIDE OF DAM.  
NOTE WHEEL RUTS AND DAMP AREA.



C-5 UPSTREAM FACE OF NORTH SIDE  
OF DAM. NOTE WHEEL RUT.



C-6 UPSTREAM FACE OF DAM - LOOKING NORTH



C-7 PRINCIPAL SPILLWAY INLET



C-8 EMERGENCY SPILLWAY INLET

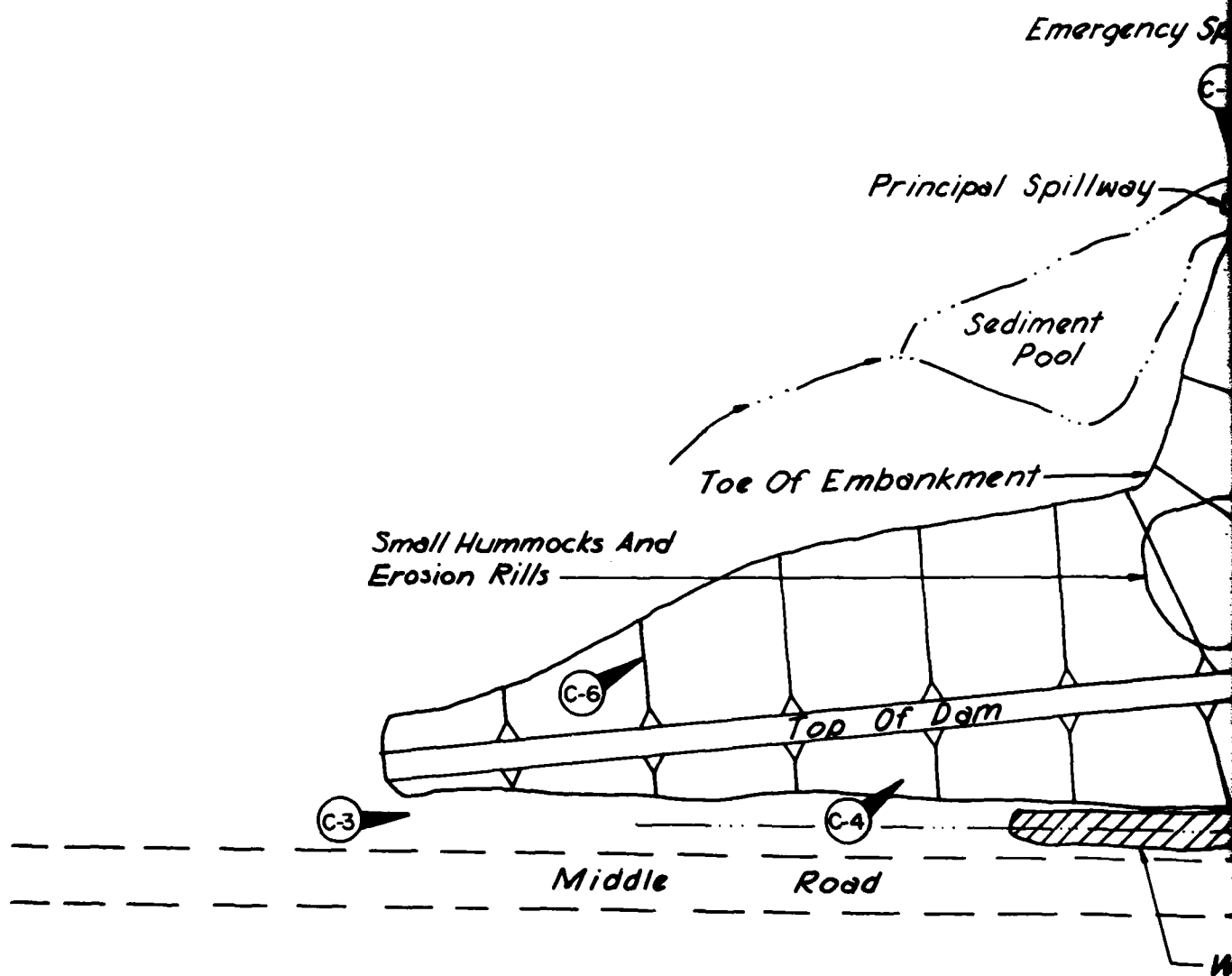


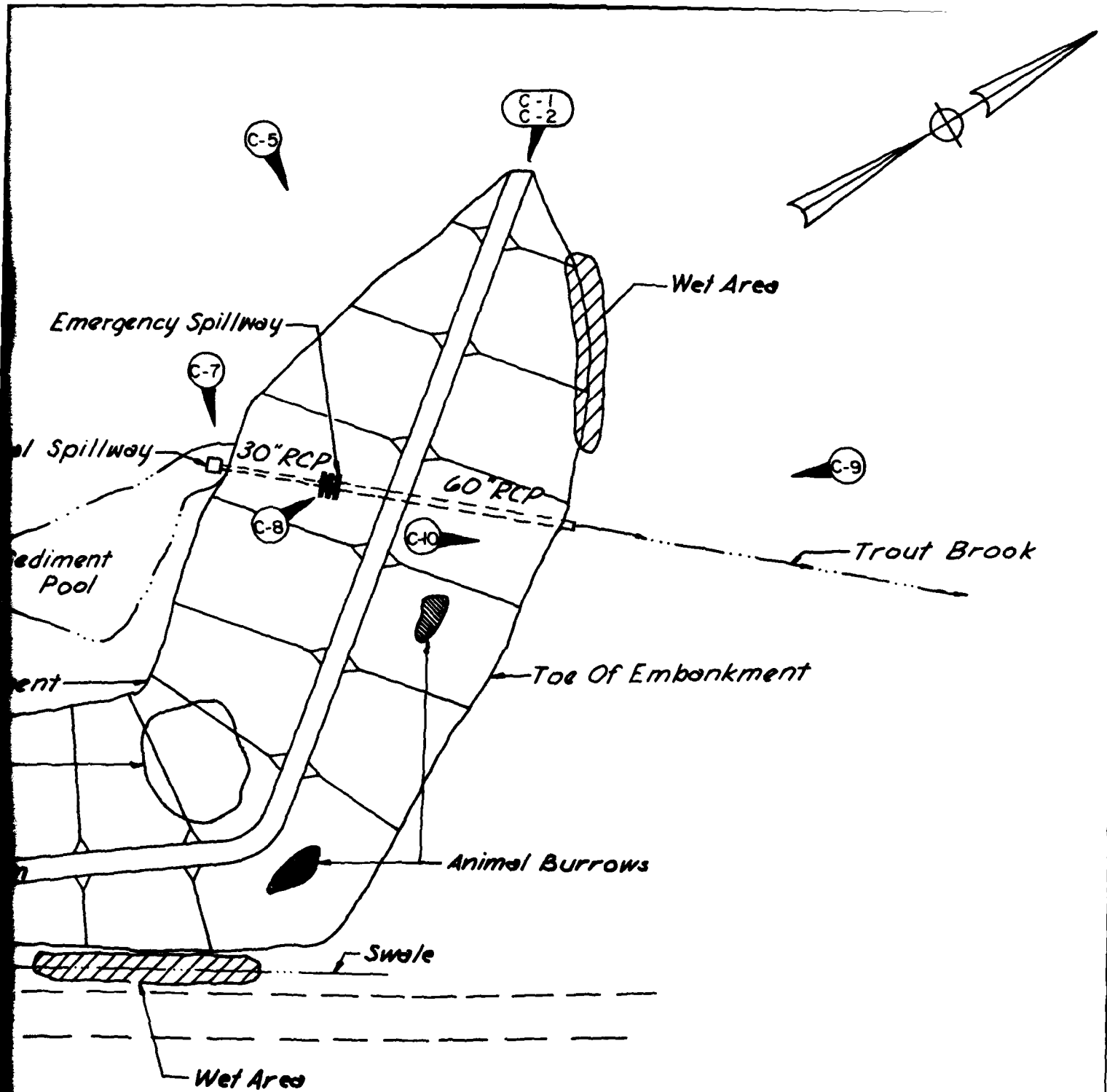
C-9 SPILLWAY OUTLET - LOOKING WEST.  
NOTE WHEEL RUTS IN EMBANKMENT



C-10 SPILLWAY OUTLET AND  
DISCHARGE CHANNEL -  
LOOKING EAST.

C-5



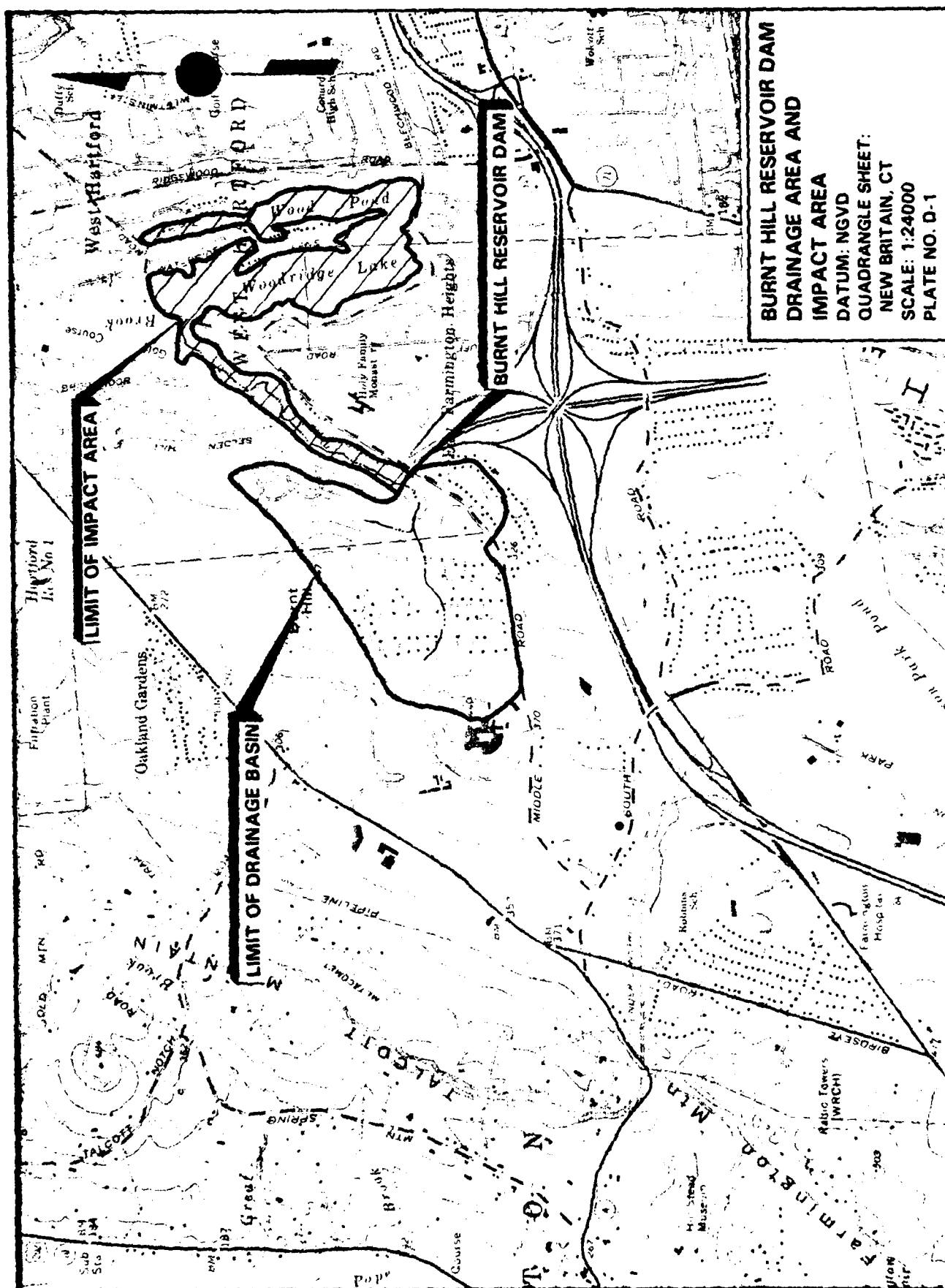


BURNT HILL RESERVOIR DAM  
PHOTO INDEX



## **APPENDIX D**

### **HYDROLOGIC AND HYDRAULIC COMPUTATIONS**



HYDROLOGIC AND HYDRAULIC ANALYSIS  
SUMMARY SHEET

Dam Burnt Hill Reservoir  
Test Flood PMF

INFLOW HYDROGRAPH DEVELOPMENT

Drainage Area .38 sq. mi.  
Probable Maximum Precipitation  
24 hour - 200 square mile PMP 21.5 inches  
Initial Rainfall Loss 0 Inch  
Uniform Rainfall Loss .1 Inch  
Snyder's Lag 1.3 hours  
Snyder's Peaking Coefficient .625  
Test Flood Inflow 1085 CFS  
PMF Inflow 1085 CFS

RESERVOIR ROUTING AND DAM OVERTOPPING

Test Flood Outflow 535\* CFS  
Spillway Capacity at Top of Dam 557\* CFS (Both Spillways)  
104 % of Test Flood  
Flow Over Spillway at Test Flood 535\* CFS (Emergency Spillway)  
Spillway Crest Elevation 266.5 Feet (Emergency Spillway)  
Top of Dam Elevation 272.7 Feet  
Test Flood Elevation 270.6 Feet

\*Flow controlled by 60 inch pipe capacity.

.....  
 FLOOD HYDROGRAPH PACKAGE (HEC-1)  
 DAM SAFETY VERSION JULY 1978  
 LAST MODIFICATION 26 FEB 79  
 .....

1	A1	DAM SAFETY ANALYSIS - JOB 88-100/86 ENJ									
2	A2	BURNI HILL RESERVOIR DAM - WEST HARTFORD, CT.									
3	A3	81-23-81	0	0	0	0	0	0	2	0	0
4	B	75	1	0	0	0	0	0	2	0	0
5	B1	5	2	1							
6	J	1	1								
7	J1	.5	1.5								
8	K	1									
9	K1	COMPUTATION OF PMF - DEVELOPMENT OF INFLOW HYDROGRAPH									
10	M	1	.38	.38							
11	P	21.9	110	124	133	142					
12	T						.1				
13	W	5.3	6.629								
14	X	.7	48.09	2.0							
15	K1	1									
16	V	ROUTING INFLOW HYDROGRAPH THRU POND - OVERTOPPING ANALYSIS									
17	V1	1									
18	V1	1	14.16	26.74	80.74	210.70	497.70				
19	SS	6	.62	5.10	26.74	80.74	210.70	497.70			
20	SE	237	246	246	250	260	270	280			
21	SS	260.5	25.33	3.0	1.9	237.50	.67	1.03	.5		
22	SD	278.7	2.7	1.5	1100						
23	K	99									

**COMP 0**

1.01	2.00	2	-01	0.00	-01	1.02	15.00	39	2.04	2.74	-10	495.
1.01	3.00	3	-01	0.00	-01	1.02	16.00	40	7.19	7.09	-10	859.
1.01	4.00	4	-01	0.00	-01	1.02	17.00	41	2.55	2.55	-10	1085.
1.01	5.00	5	-01	0.00	-01	1.02	18.00	42	2.08	1.98	-10	849.
1.01	6.00	6	-01	0.00	-01	1.02	19.00	43	.15	.05	-10	499.
1.01	7.00	7	-03	0.00	-03	1.02	20.00	44	.15	.05	-10	212.
1.01	8.00	8	-03	0.00	-03	1.02	21.00	45	.15	.05	-10	74.
1.01	9.00	9	-03	0.00	-03	1.02	22.00	46	.15	.05	-10	52.
1.01	10.00	10	-03	0.00	-03	1.02	23.00	47	.15	.05	-10	45.
1.01	11.00	11	-03	0.00	-03	1.03	0.00	48	.15	.05	-10	45.
1.01	12.00	12	-03	0.00	-03	1.03	1.00	49	.15	.05	-10	42.
1.01	13.00	13	-03	0.00	-03	1.03	2.00	50	0.00	0.00	0.00	40.
1.01	14.00	14	-05	0.00	-10	1.03	3.00	51	0.00	0.00	0.00	31.
1.01	15.00	15	-05	0.00	-10	1.03	4.00	52	0.00	0.00	0.00	34.
1.01	16.00	16	-05	0.00	-10	1.03	5.00	53	0.00	0.00	0.00	32.
1.01	17.00	17	-08	0.00	-10	1.03	6.00	54	0.00	0.00	0.00	30.
1.01	18.00	18	-04	0.00	-10	1.03	7.00	55	0.00	0.00	0.00	28.
1.01	19.00	19	-01	0.00	-10	1.03	8.00	56	0.00	0.00	0.00	26.
1.01	20.00	20	-01	0.00	-01	1.03	9.00	57	0.00	0.00	0.00	25.
1.01	21.00	21	-01	0.00	-01	1.03	10.00	58	0.00	0.00	0.00	23.
1.01	22.00	22	-01	0.00	-01	1.03	11.00	59	0.00	0.00	0.00	21.
1.01	23.00	23	-01	0.00	-01	1.03	12.00	60	0.00	0.00	0.00	20.
1.02	0.00	24	-01	0.00	-01	1.03	13.00	61	0.00	0.00	0.00	18.
1.02	1.00	25	-00	0.00	-10	1.03	14.00	62	0.00	0.00	0.00	17.
1.02	2.00	26	-00	0.00	-10	1.03	15.00	63	0.00	0.00	0.00	16.
1.02	3.00	27	-00	0.00	-10	1.03	16.00	64	0.00	0.00	0.00	15.
1.02	4.00	28	-00	0.00	-10	1.03	17.00	65	0.00	0.00	0.00	14.
1.02	5.00	29	-00	0.00	-10	1.03	18.00	66	0.00	0.00	0.00	13.
1.02	6.00	30	-00	0.00	-10	1.03	19.00	67	0.00	0.00	0.00	12.
1.02	7.00	31	-00	0.00	-10	1.03	20.00	68	0.00	0.00	0.00	11.
1.02	8.00	32	-00	0.00	-10	1.03	21.00	69	0.00	0.00	0.00	11.
1.02	9.00	33	-00	0.00	-10	1.03	22.00	70	0.00	0.00	0.00	10.
1.02	10.00	34	-00	0.00	-10	1.03	23.00	71	0.00	0.00	0.00	9.
1.02	11.00	35	-00	0.00	-10	1.04	0.00	72	0.00	0.00	0.00	9.
1.02	12.00	36	-00	0.00	-10	1.04	1.00	73	0.00	0.00	0.00	8.
1.02	13.00	37	-00	1.79	-10	1.04	2.00	74	0.00	0.00	0.00	7.
						1.04	3.00	75	0.00	0.00	0.00	7.

SUM 24.42 21.16 3.27 5791.  
( 620.11 537.11 83.11 163.98)

PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
1085.	677.	220.	80.	5793.
31.	19.	6.	2.	164.
	16.57	21.59	23.63	23.63
	420.87	540.20	600.16	600.29
	330.	437.	479.	479.
	414.	539.	590.	590.

CFS  
CMS  
INCHES  
MM  
AC+FT  
THOUS CM H

STATION 1

	INFLOW(I),	OUTFLOW(O)	AND OBSERVED FLOW(*)
400.	400.	800.	1000.
			1200.

[illegible]

9.00	57.1
10.00	58.1
11.00	59.1
12.00	60.1
13.00	61.1
14.00	62.1
15.00	63.1
16.00	64.1
17.00	65.1
18.00	66.1
19.00	67.1
20.00	68.1
21.00	69.1
22.00	70.1
23.00	71.1
0.00	72.1
1.00	73.1
2.00	74.1
3.00	75.1



•OVN•

HYDROGRAPH AT STA 1 FOR PLAN 1. RTIO 1									
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	1.	3.	6.	10.	25.	17.	0.	0.	0.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
9.	25.	33.	37.	37.	81.	169.	247.	429.	429.
52.	42.	106.	37.	26.	25.	23.	21.	20.	20.
18.	17.	15.	14.	13.	12.	11.	11.	10.	10.
9.	8.	7.	7.	7.	6.	6.	5.	5.	5.
5.	4.	4.	3.	3.	3.	3.	3.	3.	3.
PEAK									
CFS									
542.									
CFS									
15.									
INCHES									
0.28									
MM									
219.43									
AC4FT									
168.									
TMOUS CU M									
207.									
270.									
295.									
TOTAL VOLUME									
2896.									
11.82									
300.16									
239.									
295.									

HYDROGRAPH AT STA 1 FOR PLAN 1. RTIO 2									
1.	1.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	13.	36.	51.	35.	16.	0.	0.	0.
3.	2.	2.	2.	2.	2.	1.	1.	1.	1.
18.	66.	71.	73.	74.	162.	337.	495.	859.	859.
1085.	499.	212.	74.	52.	45.	45.	42.	40.	40.
37.	32.	30.	28.	26.	25.	23.	21.	20.	20.
18.	17.	15.	14.	13.	12.	11.	11.	10.	10.
9.	8.	7.	7.	7.	6.	6.	5.	5.	5.
PEAK									
CFS									
1085.									
CFS									
31.									
INCHES									
16.57									
MM									
429.87									
AC4FT									
336.									
TMOUS CU M									
414.									
539.									
590.									
TOTAL VOLUME									
5703.									
161.									
23.63									
600.29									
479.									
590.									

# HYDROGRAPH ROUTING

## ROUTING INFLOW HYDROGRAPH THRU POND - OVERTOPPING ANALYSIS

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	1	0	0	0	0	1	0	0
ROUTING DATA								
GLOSS	CLOSS	AVG	IRF	ISAME	IOPT	IPMP	LSTR	
0.0	0.000	0.00	1	1	0	0	0	
NSTPS								
1	0	0	0.000	0.000	0.000	0.000	0.000	0
LAG								
1	0	0	0.000	0.000	0.000	0.000	0.000	0
MSK								
1	0	0	0.000	0.000	0.000	0.000	0.000	0
STORA								
1	0	0	0.000	0.000	0.000	0.000	0.000	0
ISPRAT								
1	0	0	0.000	0.000	0.000	0.000	0.000	0
CAPACITY=								
0.	1.	5.	14.	21.	41.	220.	498.	
ELEVATION=								
237.	240.	244.	248.	250.	260.	270.	280.	

D-9

AD-A144 622

NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS  
BURNT HILL RESERVOIR..(U) CORPS OF ENGINEERS WALTHAM MA  
NEW ENGLAND DIV MAY 81

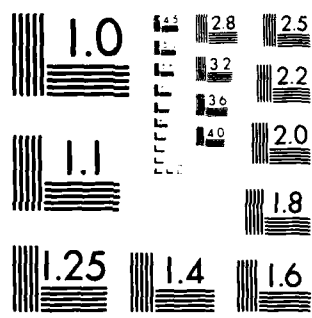
22

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F/G 13/13 NL



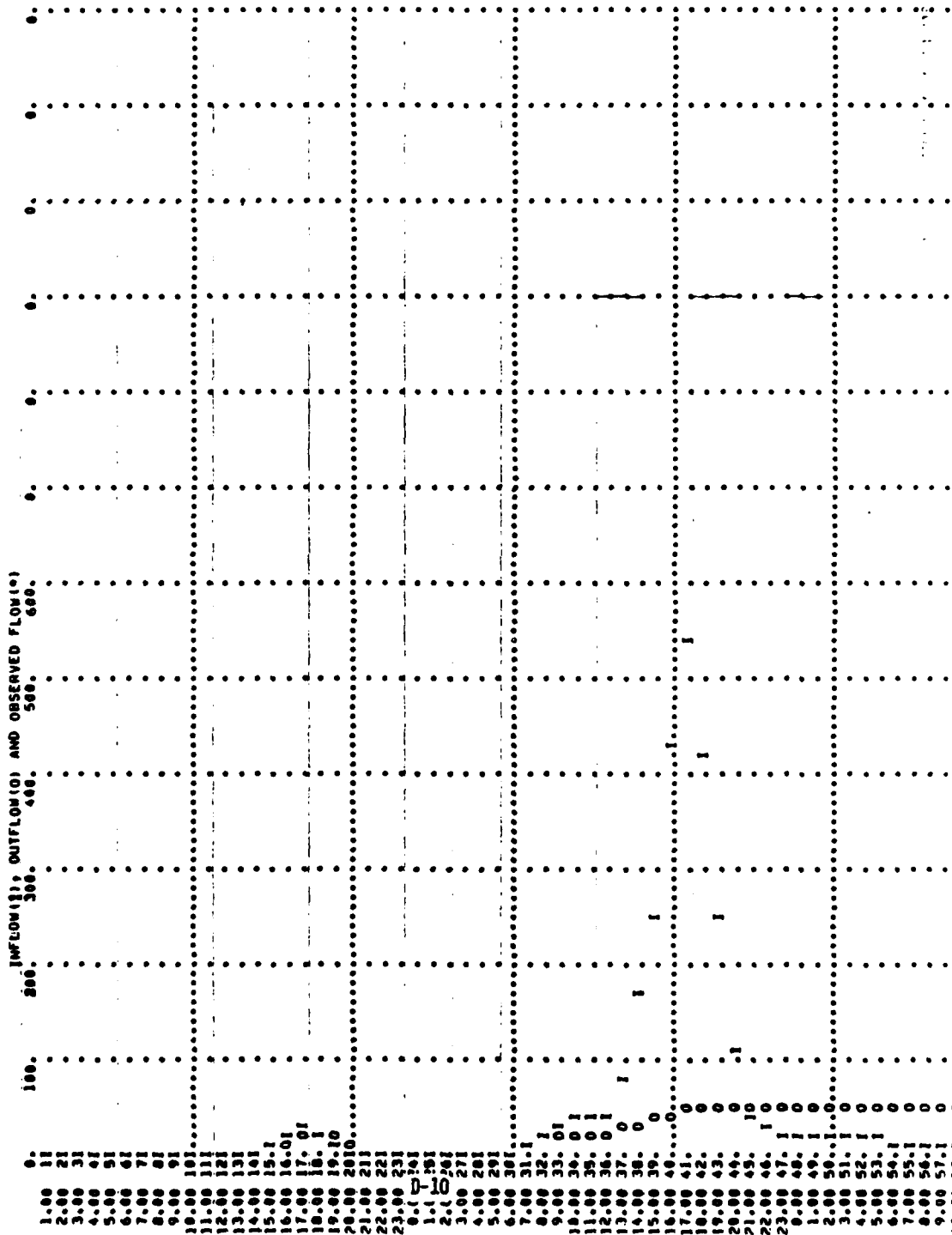
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MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS-1963-A

•OVF•

STATION 1



2011

...

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10

D-11

STATION 1, PLAN 1, RATIO 2  
END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW									
0.	0.	1.	0.	0.	0.	1.	0.	1.	0.
1.	0.	2.	5.	10.	17.	21.	25.	25.	23.
20.	17.	10.	0.	3.	1.	2.	1.	2.	1.
12.	19.	25.	20.	30.	32.	35.	39.	45.	50.
20.	00.	47.	49.	29.	100.	97.	76.	65.	50.
50.	53.	53.	52.	52.	52.	52.	52.	52.	52.
52.	51.	51.	51.	51.	51.	50.	50.	50.	50.
49.	49.	49.	49.	49.	49.	49.	49.	49.	49.
STORAGE									
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3.	1.	0.	0.	0.	0.	0.	0.	0.	0.
0.	2.	5.	0.	12.	16.	22.	40.	71.	123.
193.	236.	235.	216.	197.	166.	181.	177.	175.	173.
175.	170.	169.	167.	165.	163.	161.	159.	156.	153.
151.	148.	145.	142.	139.	136.	133.	130.	126.	123.
120.	117.	113.	110.	106.					
STAGE									
237.2	237.5	237.6	237.6	237.6	237.6	237.6	237.6	237.6	237.6
237.0	237.5	237.6	237.6	237.6	237.6	237.6	237.6	237.6	237.6
241.7	240.5	238.6	237.5	237.7	237.6	237.6	237.6	237.6	237.6
239.0	241.2	243.0	245.5	247.1	248.4	250.3	253.2	258.4	263.0
200.1	270.6	270.0	269.7	268.4	267.6	267.2	267.0	268.8	268.7
200.6	206.5	206.3	206.2	206.1	205.9	205.8	205.6	205.4	205.2
205.0	204.8	204.6	204.4	204.2	204.0	203.8	203.5	203.3	203.1
202.8	202.6	202.3	202.1	201.8					

D-12

PEAK OUTFLOW IS 685. AT TIME 42.00 HOURS

PEAK				TOTAL VOLUME			
685.	402.	145.	63.	4595.			
19.	11.	4.	2.	120.			
CFS							
CMH							
INCHES							
MM							
AC-FT							
THOUS CB H							

•OVF•

STATION 1

INFLOW(S), OUTFLOW(S) AND OBSERVED FLOW(S)

	200.	400.	600.	800.	1000.	1200.	
0.							
1.00	11						
2.00	21						
3.00	31						
4.00	41						
5.00	51						
6.00	61						
7.00	71						
8.00	81						
9.00	91						
10.00	101						
11.00	111						
12.00	121						
13.00	131						
14.00	141						
15.00	15.1						
16.00	16.01						
17.00	17.0.1						
18.00	18.01						
19.00	19.1						
20.00	2019						
21.00	2110						
22.00	2210						
23.00	231						
0.00	141						
1.00	131						
2.00	141						
3.00	271						
4.00	281						
5.00	291						
6.00	301						
7.00	31.1						
8.00	32.01						
9.00	33.0.1						
10.00	34.0.1						
11.00	35.0.1						
12.00	36.0.1						
13.00	37.0.1						
14.00	38.0.1						
15.00	39.0.1						
16.00	40.0.1						
17.00	41.0.1						
18.00	42.0.1						
19.00	43.0.1						
20.00	44.0.1						
21.00	45.0.1						
22.00	46.0.1						
23.00	47.0.1						
0.00	48.0.1						
1.00	49.0.1						
2.00	50.0.1						
3.00	51.0.1						
4.00	52.0.1						
5.00	53.0.1						
6.00	54.0.1						
7.00	55.0.1						
8.00	56.0.1						
9.00	57.0.1						



000 000 000

11.00	59.10	
12.00	60.10	
13.00	61.10	
14.00	62.10	
15.00	63.10	
16.00	64.10	
17.00	65.10	
18.00	66.10	
19.00	67.10	
20.00	68.10	
21.00	69.10	
22.00	70.10	
23.00	71.10	
24.00	72.10	
25.00	73.10	
26.00	74.10	
27.00	75.10	

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS  
 FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)  
 AREA IN SQUARE MILES (SQUARE KILOMETERS)

RATIOS APPLIED TO FLOWS

OPERATION	STATION	AREA	PLAN	RATIO 1	RATIO 2
				.50	1.00
HYDROGRAPH AT	1	.38	1	542.	1085.
	(	.98)	(	15.36)	30.72)
ROUTED TO	1	.38	1	52.	685.*
	(	.98)	(	1.46)	19.30)

\* BASED ON WEIR FLOW. OUTFLOW RATE IS  
 ACTUALLY 535 CFS. 60 INCH PIPE FLOW CONTROLS

# SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....									
RATIO OF PMF	MAXIMUM RESERVOIR W.S. ELEV	ELEVATION		INITIAL VALUE	SPILLWAY CREST		TOP OF DAM		TIME OF FAILURE HOURS
		STORAGE	OUTFLOW		240.00	266.50	272.70	295.	
				1.	171.			1231.	
				15.		53.			
				MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	
.50	265.91			0.00	163.	52.	0.00	45.00	0.00
1.00	270.59			0.00	236.	685.4	0.00	42.00	0.00

\* BASED ON WEIR FLOW. OUTFLOW RATE IS  
ACTUALLY 536 CFS. 60 INCH PIPE FLOW CONTROLS

\* BASED ON WEIR FLOW. OUTFLOW RATE IS  
ACTUALLY 536 CFS. 60 INCH PIPE FLOW CONTROLS

Burnt Hill Reservoir  
Dam Failure Analysis

1. Failure discharge with pool at Em.Spillway (elev. 266.5) = 63300 CFS
2. Depth of water in reservoir at time of failure = 29.5 ft.
3. Maximum depth of flow downstream of dam = 29± ft.
4. Water surface elevation just downstream)  
of dam at time of failure ) = 266±

The failure discharge of 63300 CFS will enter and flow downstream 4200 feet until the brook enters Woodbridge Lake.  
Valley storage in this 4200 feet length of brook is significant  
in reducing the discharge. The failure flow will be contained by  
Woodbridge Lake and Wood Pond. The failure profile will have the  
following hydraulic characteristics:

DISTANCE FROM THE DAM	WATER SURFACE ELEVATION	DEPTH (ft.)	REMARKS
0	266.5	29.5	At Dam
650	251.0	19.0	
1300	239.0	14.0	
3200	195.5	10.5	
4200	170.3	1.8	
			Woodbridge Lake

NOTES:

"Rule of Thumb" Guidance for Estimating  
Downstream Dam Failure Analysis

DATA

Name of Dam Burnt Hill Reservoir  
Location West Hartford, Connecticut  
Drainage Area 0.38 sq. mi., Top of Dam 272.7  
Spillway Type Concrete Riser, Crest of Spillway 266.5 (Emergency)  
Surface Area @ Crest Elev. 15 Acres = 0.02 sq. mi.  
Pool Bottom Near Dam = 237.0  
Assumed Side Slopes of Embankments = 2H:1V  
Depth of Pool at Dam ( $Y_o$ ) = 29.5 Feet  
Mid-Height Elev. 251.8  
Length of Dam at Crest = 1100 Feet  
Length of Dam at Mid-Height = 588 Feet  
40% of Dam Length at Mid-Height =  $W_b$  = 235.2 Feet

Step 1

Storage (S) at time of failure 154 Ac-FT

Step 2

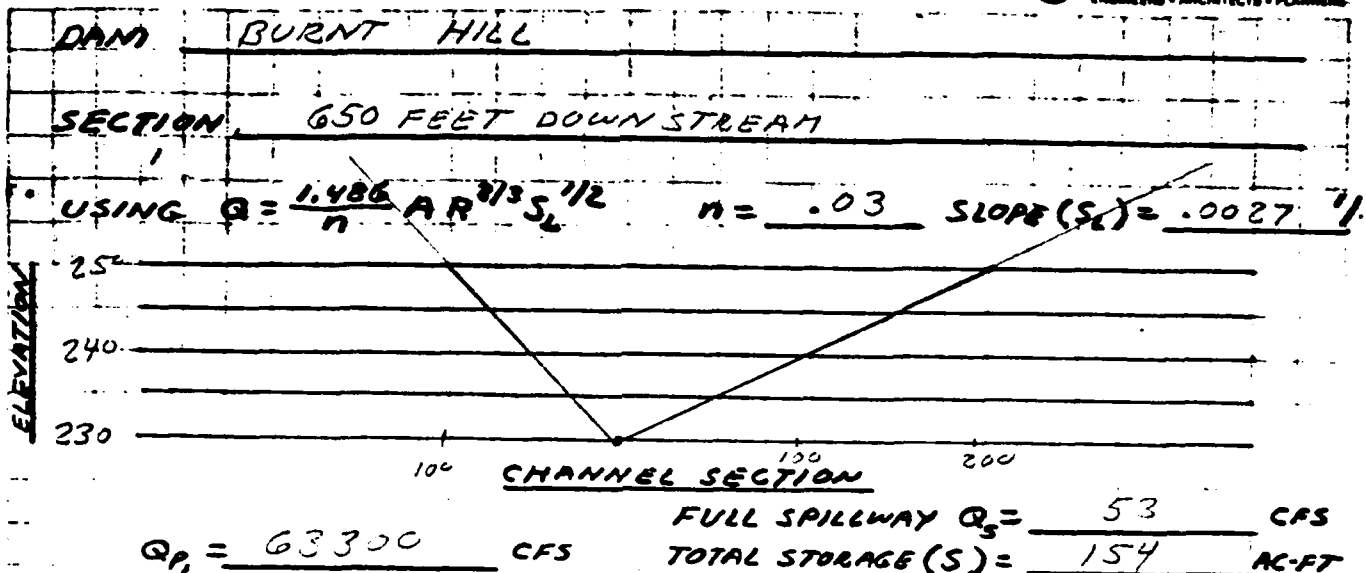
$$\begin{aligned} &\text{Peak Failure Discharge} \\ Q_{pl} &= 8/27 W_b \sqrt{g} Y_o^{3/2} \\ &= (1.68) (W_b) (Y_o)^{3/2} = \underline{63300} \text{ cfs} \end{aligned}$$

Failure is assumed to coincide with pool elevation at Emergency Spillway Crest.

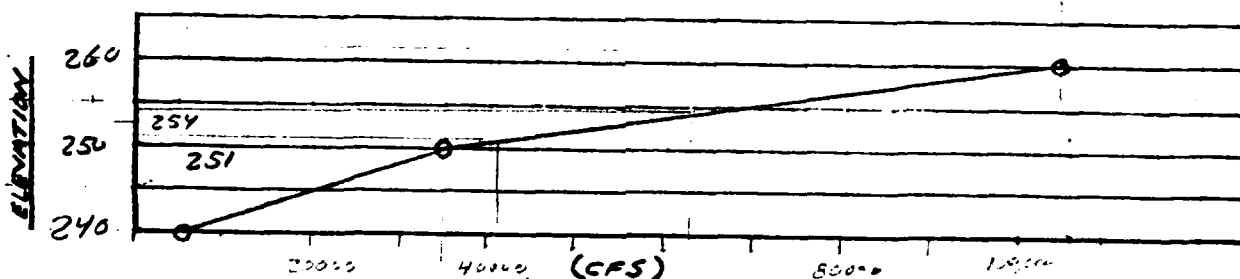
NOTES:

BY RAJ DATE 11/12/80 SUBJECT DAM INSPECTION STUDY  
 CHKD BY JR DATE 12/4/80 DAM FAILURE ANALYSIS

SHEET NO. 1 OF 4  
 JOB NO. 80-100/06  
 PURCELL ASSOCIATES  
 ENGINEERS - ARCHITECTS - PLANNERS



ELEV	AREA	WP	R	Q	DEPTH
240	750	150	5	6000	10
250	3000	300	10	36000	20
260	6750	450	15	106000	30



$$V_1 = \left( \frac{29.5 + 240}{2} \right) \left( \frac{235 + 350}{2} \right) \left( \frac{650}{43560} \right) \left( \frac{1}{2} \right) = \underline{58} \text{ AC-FT}$$

$$Q_{p2} = Q_p (1 - V_1/S) = \underline{39300} \text{ CFS} \quad V_{AVE} = \underline{54}$$

$$V_2 = \left( \frac{29.5 + 24}{2} \right) \left( \frac{1}{1} \right) = \underline{50} \text{ AC-FT}$$

$$Q_p = Q_p (1 - V_{AVE}/S) = \underline{41000} \text{ CFS} \quad \text{ELEV} = \underline{251.0}$$

DEPTH = 21.0

FULL SPILLWAY DEPTH = 21

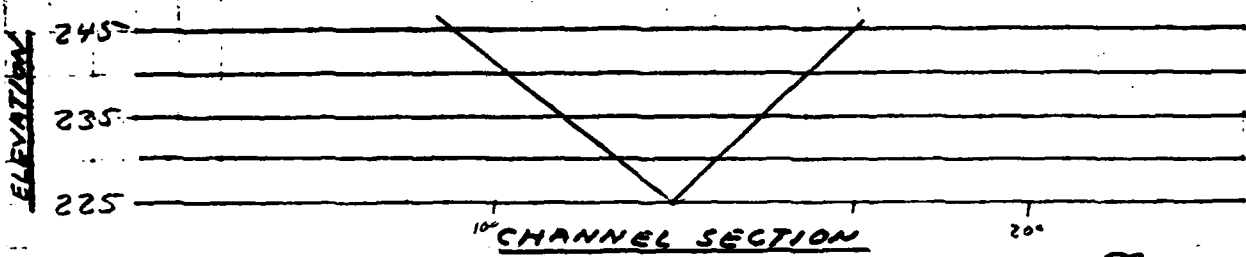
INCREASE DUE TO DAM FAILURE = 19.0

BY EDJ DATE 11/12/80 SUBJECT DAM INSPECTION STUDY  
 CHKD. BY JR DATE 12/4/80  
DAM FAILURE ANALYSIS

SHEET NO. 2 OF 4  
 JOB NO. 80-100/06  
 PURCELL ASSOCIATES  
 ENGINEERS • ARCHITECTS • PLANNERS

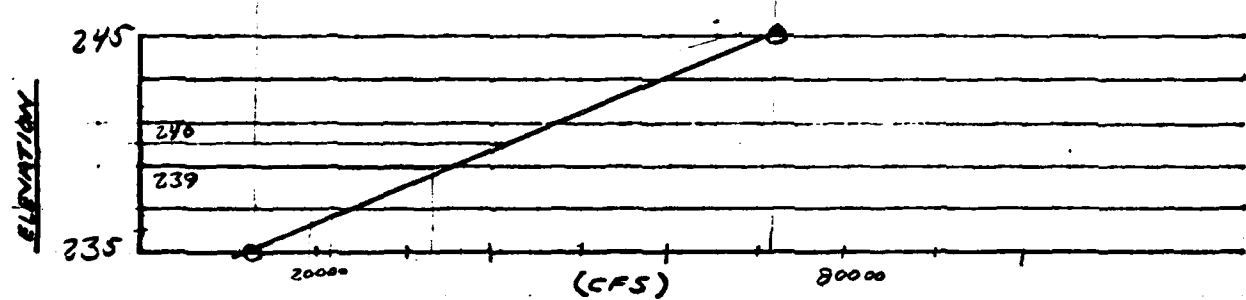
DAM BURNT HILL  
 SECTION 1300' DOWN STREAM

USING  $Q = \frac{1.486}{n} A R^{2/3} S^{1/2}$   $n = .03$  SLOPE ( $S_L$ ) = .018



$Q_A = 41000$  CFS FULL SPILLWAY = 53 CFS  
 TOTAL STORAGE = 154 AC-FT

ELEV	AREA	WP	R	Q	V IN
235	600	120	5	12000	10
245	2300	230	10	71000	20



$$V_1 = \left( \frac{15 + 15}{2} \right) \left( \frac{350 + 180}{2} \right) \left( \frac{650}{43560} \right) \left( \frac{1}{2} \right) = 30 \text{ AC-FT}$$

$$Q_{P_2} = Q_A (1 - V_1/S) = 33000 \text{ CFS} \quad V_{AVE} = 30$$

$$V_2 = \left( \frac{15 + 14}{2} \right) (2.0) = 29 \text{ AC-FT}$$

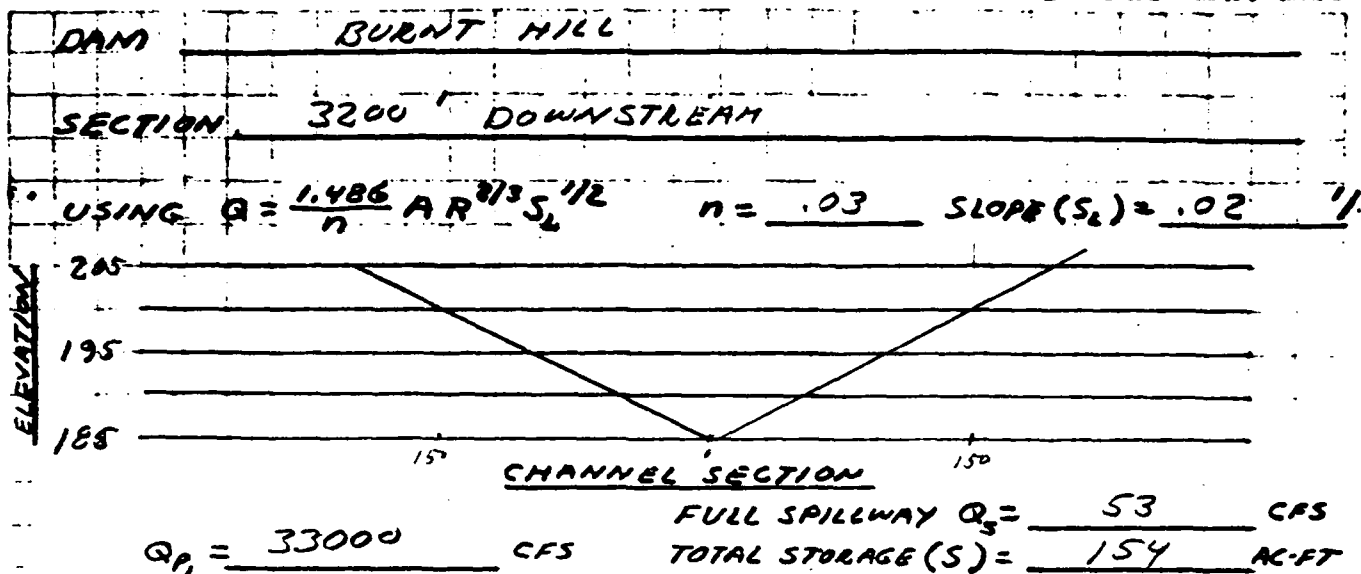
$$Q_{P_3} = Q_{P_2} (1 - V_{AVE}/S) = 33000 \text{ CFS} \quad \text{ELEV} = 239.0$$

$$\text{DEPTH} = 14.0$$

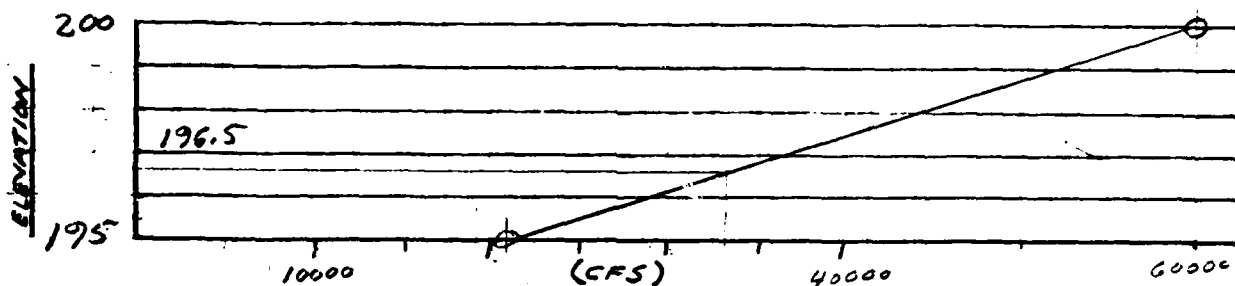
FULL SPILLWAY DEPTH = 21  
 INCREASE DUE TO DAM FAILURE = 12.0

BY FR DATE 11/12/86 SUBJECT DAM INSPECTION STUDY  
 CHD. BY JR DATE 12/14/86 DAM FAILURE ANALYSIS

SHEET NO. 3 OF 4  
 JOB NO. 80-100/06  
 PURCELL ASSOCIATES  
 ENGINEERS - ARCHITECTS - PLANNERS



ELEV	AREA	WP	R	Q	DEPTH
195	1000	700	5	21000	10
200	2250	300	7.5	60000	15



$$V_1 = \left( \frac{11.5 + 11.5}{2} \right) \left( \frac{180 + 230}{2} \right) \left( \frac{1900}{43560} \right) \left( \frac{1}{2} \right) = 51 \text{ AC-FT}$$

$$Q_{p2} = Q_p (1 - V_1/S) = 22000 \text{ CFS} \quad V_{AVE} = 51$$

$$V_2 = \left( \frac{11.5 + 10.5}{2} \right) (4.5) = 50 \text{ AC-FT}$$

$$Q_{p3} = Q_p (1 - V_{AVE}/S) = 22000 \text{ CFS} \quad \text{ELEV} = 196.5$$

DEPTH = 10.5

FULL SPILLWAY DEPTH = 21

INCREASE DUE TO DAM FAILURE = 8.5



BY JR DATE 12-4-80  
CHKD. BY ERT DATE 12-4-80

SUBJECT DAM INSPECTION STUDY  
DAM FAILURE ANALYSIS

SHEET NO. 4 OF 4  
JOB NO. 80-100-06  
PURCELL ASSOCIATES  
ENGINEERS • ARCHITECTS • PLANNERS

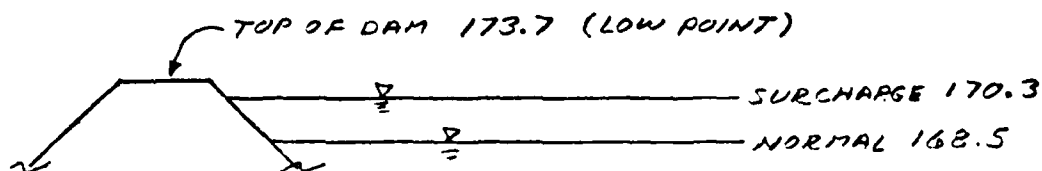
DETERMINE RISE IN WOODBRIDGE LAKE & WOOD POND

SURFACE AREA = 86 AC

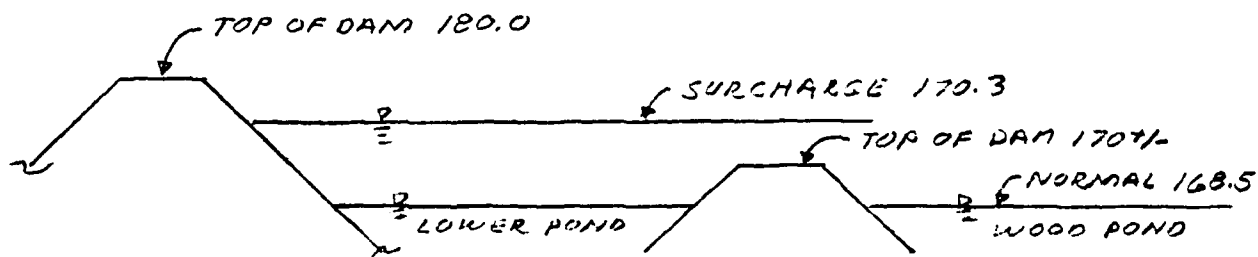
FAILURE VOLUME = 154 AC-FT

$$\text{RISE IN LAKE LEVEL} = \frac{154 \text{ AC-FT}}{86 \text{ AC}} = 1.8 \text{ FT}$$

WOODBRIDGE LAKE OUTLET



WOOD POND OUTLET



FLOOD CONTAINED BY WOODBRIDGE LAKE  
AND WOOD POND (LOWER POND)

## Burnt Hill Reservoir

### A. Size Classification

Height of dam = 38.2 ft.; hence Small

Storage capacity at top of dam (elev. 272.7) = 280 AC-FT.; hence Small

Adopted size classification: Small

### B.i) Hazard Potential

More than 15 homes and buildings may suffer excessive damage  
and there is the potential for the loss of more than a few  
lives in the event of dam failure.

Adopted hazard classification: High

### ii) Impact of Failure of Dam with pool at Emergency Spillway Crest.

It is estimated from the "rule of thumb" failure hydrograph, that the following adverse impacts are a possibility by the failure of this dam.

- a) Loss of homes 15+;
- b) Loss of buildings 1+;
- c) Loss of highways or roads 4;
- d) Loss of bridges 4;

The failure profile can affect a distance of 4200 feet from the dam.

### C. Hazard Potential Classifications

<u>HAZARD</u>	<u>SIZE</u>	<u>TEST FLOOD RANGE</u>
<u>High</u>	<u>Small</u>	<u>1/2 PMF to PMF</u>
Adopted Test Flood = <u>PMF</u> = <u>2860</u> CSM		
= <u>1085</u> CFS		

### D. Overtopping Potential

Drainage Area 243 acres = 0.38 sq. miles

Spillway crest elevation = (Emergency Spillway) 266.5

Top of Dam Elevation = 272.7

#### Maximum spillway discharge

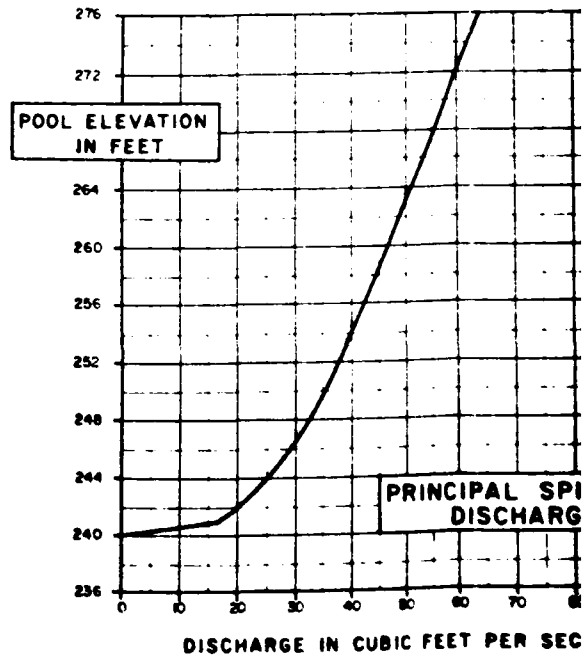
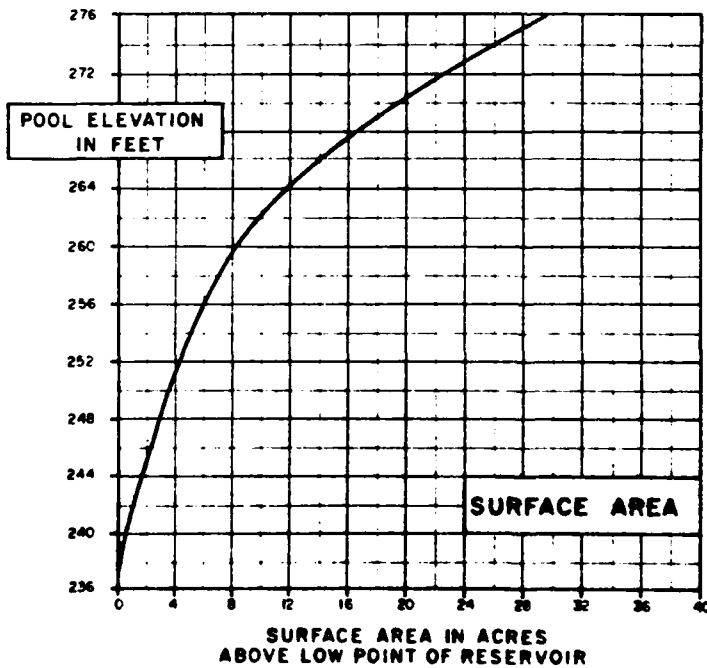
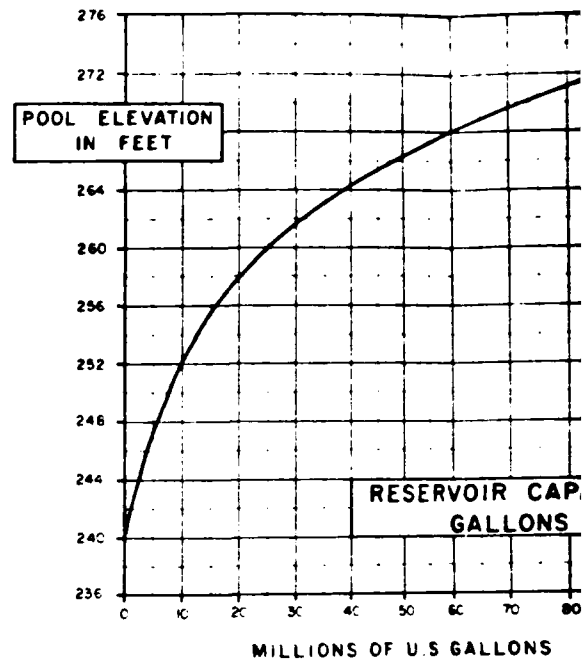
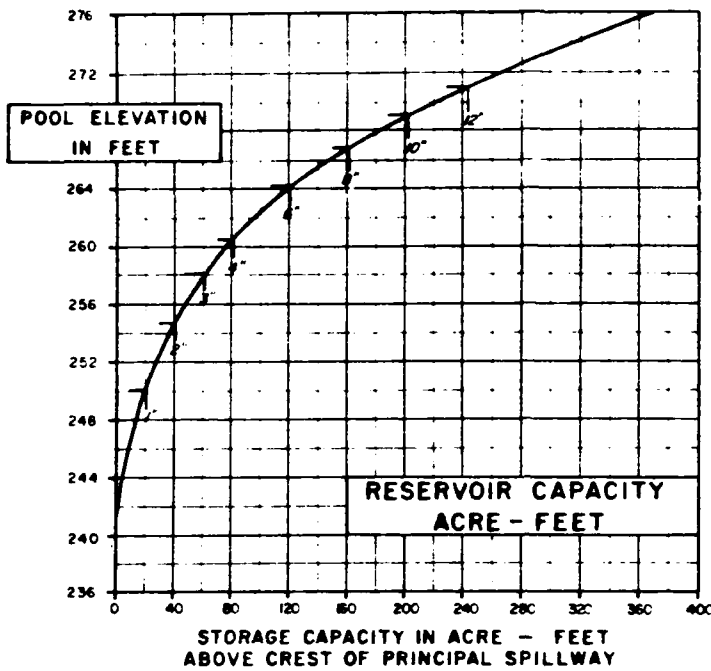
Capacity without overtopping of dam = 557 CFS

"test flood" inflow discharge = 1085 CFS

"test flood" outflow discharge = 535 CFS

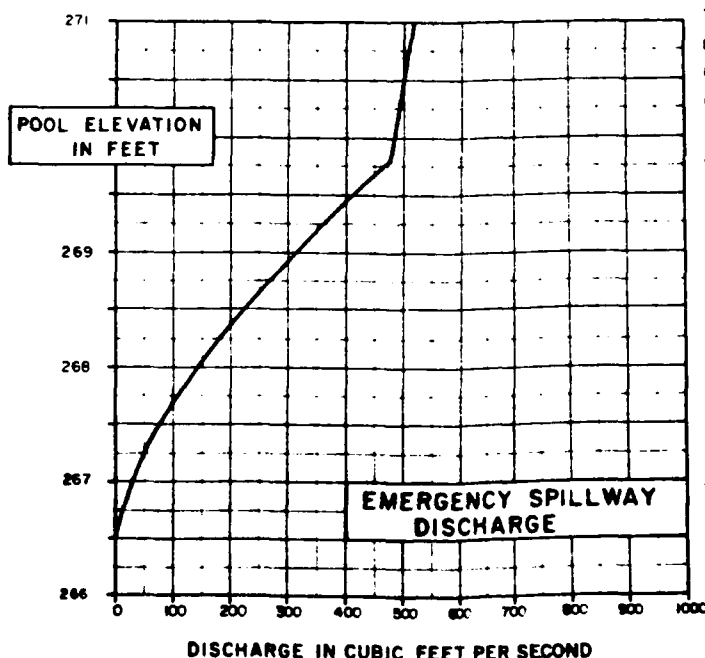
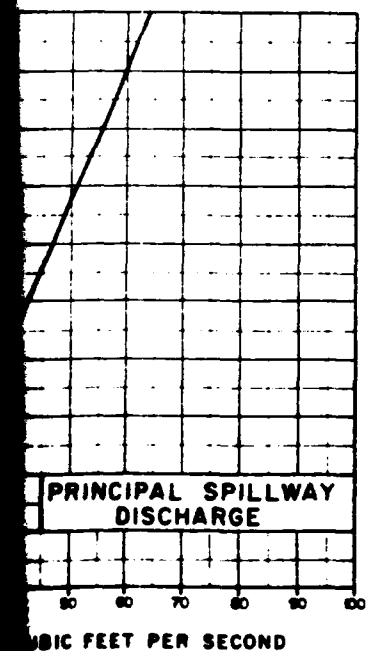
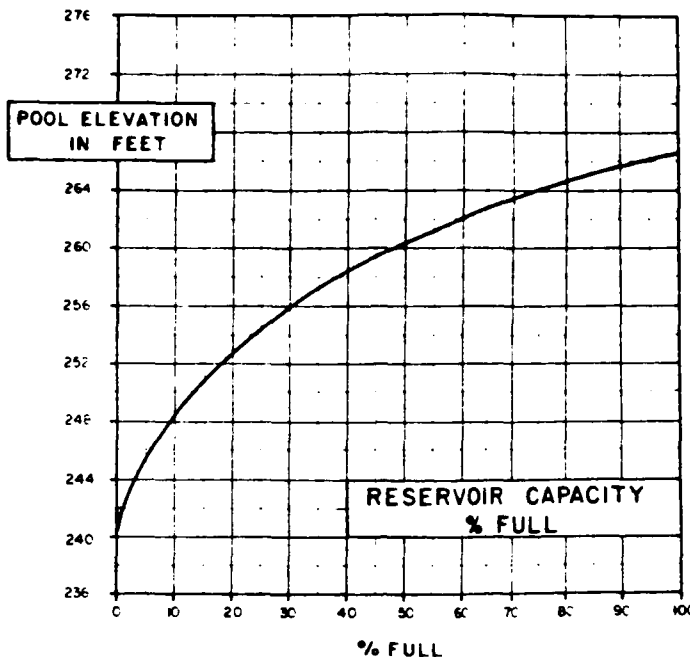
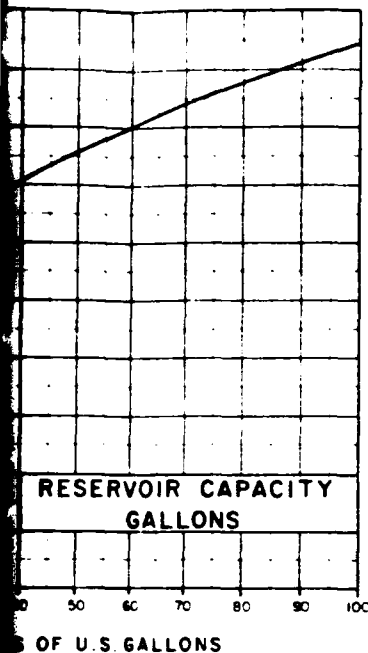
# RESERVOIR OPERA

## BURNT HILL RESERVOIR - TROUT BROOK - SOU



# OPERATION DATA

## BROOK - SOUTH BRANCH PARK RIVER WATERSHED



### PERTINENT DATA

TOP OF DAM	EL. 272.7
DESIGN HIGH WATER	EL. 269.7
CREST EMERGENCY SPILLWAY	EL. 266.5
CREST PRINCIPAL SPILLWAY	EL. 240.0
INVERT LOW FLOW ORIFICE	EL. 237.0
DRAINAGE AREA CONTROLLED	0.38 SQ. MI.
1" OF RUNOFF	20.26 ACRE-Feet
ALL ELEVATIONS REFER TO METROPOLITAN DISTRICT DATUM	
<u>CONSTRUCTED BY:</u>	
STATE OF CONNECTICUT DEPARTMENT OF AGRICULTURE & NATURAL RESOURCES JOSEPH N. GILL, COMMISSIONER	
<u>IN ASSOCIATION WITH THE:</u>	
U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE PUBLIC LAW 566 FUNDS	
<u>DESIGNED BY:</u>	
U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE	
<u>STATUS:</u>	
COMPLETED OCTOBER 17, 1966	

Anderson-Nichols Associates February 1967

## **APPENDIX E**

**INFORMATION AS CONTAINED IN THE  
NATIONAL INVENTORY OF DAMS**

NOT AVAILABLE AT THIS TIME

DATE  
FILME